Dysfunctional Posttraumatic Cognitions in Children and Adolescents: Their Predictors and Relations with Psychological Symptoms

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To Gerd de Haan

In loving memory of the best dad in the world

Abstract

Dysfunctional posttraumatic cognitions (PTCs) mean that the child appraises a traumatic event (TE) and its consequences as extremely negative, which in turn impedes timely trauma adjustment. Although substantial research has been done in this area within the last decade, predictors of dysfunctional PTCs and longitudinal directed associations between dysfunctional PTCs and psychological symptoms have still been barely investigated in children and adolescents.

Therefore, this thesis aimed to better understand the multivariate association between dysfunctional PTCs and trauma, child, and social characteristics. Furthermore, relations were investigated between dysfunctional PTCs and posttraumatic stress symptoms (PTSS), internalizing, and externalizing problems using a network analysis and cross- and longitudinal structural equation modelling. International samples including school-aged children and adolescents exposed to TEs and maltreatment were used to raise the generalizability of the thesis's findings.

Findings for predictors of dysfunctional PTCs yielded mixed results. However, moderate to strong cross- and longitudinal associations were consistently found between dysfunctional PTCs and psychological symptoms across samples.

Since dysfunctional PTCs seem universally relevant in children and adolescents exposed to TEs or maltreatment, addressing them in clinical assessments and therapy is likely to be important. The use of international trauma and maltreatment samples, state-of-the-art statistical analyses, and new or barely investigated research questions might encourage other researchers to tackle further relevant topics from new angles, such as the important question for both research and clinical practice regarding the directed relationship between dysfunctional PTCs, PTSS (re-experiencing, avoidance, and hyperarousal), and depression. Further, the association between dysfunctional PTCs and externalizing problems merits more attention.

Zusammenfassung

Dysfunktionale posttraumatische Kognitionen (PTCs) bedeuten, dass das Kind das traumatische Ereignis (TE) und seine Folgen als extrem negativ bewertet, was wiederum eine zeitnahe Traumaverarbeitung behindert. Obwohl im letzten Jahrzehnt viel Forschung in diesem Bereich erfolgte, sind Prädiktoren von dysfunktionalen PTCs und die längsschnittlichen gerichteten Zusammenhänge zwischen dysfunktionalen PTCs und psychischen Symptomen kaum untersucht bei Kindern und Jugendlichen.

Das Ziel des vorliegenden Dissertationsprojekts war es deshalb den multivariaten Zusammenhang zwischen dysfunktionalen PTCs und Charakteristika des Traumas, des Kindes und des Umfeldes besser zu verstehen. Zudem wurden die Beziehungen zwischen dysfunktionalen PTCs und posttraumatischen Stresssymptomen (PTSS), Depression, und internalisierenden und externalisierenden Problemen mit einer Netzwerk Analyse und quer- und längsschnittlichen Strukturgleichungsmodellen untersucht. Internationale Stichproben mit Kinder und Jugendlichen im Schulalter, die TEs oder Misshandlung erlebt hatten, wurden eingeschlossen, um die Ergebnisse des Dissertationsprojektes generalisierbarer zu machen.

Die Ergebnisse bezüglich der Prädiktoren von dysfunktionalen PTCs waren uneinheitlich. Über alle Stichproben hinweg wurden aber moderate bis starke quer- und längsschnittliche Zusammenhänge zwischen dysfunktionalen PTCs und psychischen Symptomen gefunden.

Da dysfunktionale PTCs für Kinder und Jugendlichen mit TEs oder Misshandlungserfahrungen relevant zu sein scheinen, scheint es wichtig zu sein, sie in der Diagnostik und der Therapie zu adressieren. Der Einsatz von internationalen Trauma- und Misshandlungsstichproben, neusten statistischen Analysen und neuen bzw. kaum untersuchten Forschungsfragen könnte andere Forscher ermutigen, weitere relevante Themen anzugehen, wie die wichtige Frage für Forschung und klinische Praxis bezüglich der gerichteten Beziehung zwischen dysfunktionalen PTCs, PTSS (Wiedererleben, Vermeidung, und Übererregung) und Depression. Zudem verdient der Zusammenhang zwischen dysfunktionalen PTCs und externalisierenden Problemen mehr Aufmerksamkeit.

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Abbreviations

ASD	acute stress disorder
AIC	Akaike information criterion
APA	American Psychological Association
BIC	Bayesian information criterion
CANMANAGE study	CAN = Child Abuse and Neglect, MANAGE = Case Management study
CDI	Children's Depression Inventory
CFI	comparative fit index
CPTCI	Child Post-Traumatic Cognitions Inventory
CPTCI-PC	CPTCI permanent and disturbing change subscale
CPTCI-S	Child Post-Traumatic Cognitions Inventory short form
CPTCI-SW	CPTCI fragile person in a scary world subscale
CS coefficient	correlation stability coefficient
DSM	Diagnostic and Statistical Manual of Mental Disorders
DTD	developmental trauma disorder
EBIC	extended Bayesian information criterion
EI	expected influence
EM	expectation maximization
FIML	full information maximum likelihood
ICD	International Classification of Diseases
JVQ	Juvenile Victimization Questionnaire
LASSO	least absolute shrinkage and selection operator
MLR	robust maximum likelihood estimator

PDS	Posttraumatic Diagnostic Scale
PE	prolonged exposure
PI	principal investigator
PTC study	Dysfunctional Posttraumatic Cognitions in Children and Adolescents study
PTCI	Posttraumatic Cognitions Inventory
PTCs	dysfunctional posttraumatic cognitions
PTSD	posttraumatic stress disorder
PTSS	posttraumatic stress symptoms
RMSEA	root mean square error of approximation;
RTA	road traffic accident
SDQ	Strengths and Difficulties Questionnaire
SEM	structural equation modelling
SES	socio-economic status
SPSS	Statistical Package for Social Sciences
SRMR	standardized root mean square residual
ssaBIC	sample-size-adjusted BIC
TCT study	TreatChildTrauma study
TE(s)	traumatic event(s)
Tf-CBT	trauma-focused cognitive behavioural therapy
TLI	Tucker Lewis index
UCLA PTSD-RI	University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index
WHO	World Health Organization

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A General Introduction

This thesis addresses dysfunctional posttraumatic cognitions (PTCs) in children and adolescents after a traumatic event (TE) and/or maltreatment. Dysfunctional PTCs mean that the child appraises the TE or maltreatment event and its consequences as extremely negative, which in turn impedes timely trauma adjustment. Research across countries and trauma types has shown that dysfunctional PTCs play an important part in trauma adjustment in children and adolescents. Cognitive trauma theories suggest that dysfunctional PTCs might explain why some children and adolescents recover quickly from a TE, whereas others display persistent distress. They also play a crucial role in evidence-based treatments for children and adolescents exposed to TEs or maltreatment experiences. Although substantial research has been done in this area within the last decade, predictors of dysfunctional PTCs and the longitudinal directed associations between dysfunctional PTCs and psychological symptoms have barely been investigated.

The general introduction starts with a definition of TEs and maltreatment and summarizes their prevalence rates in children and adolescents. Furthermore, their psychological impact is discussed, focusing on trauma-related disorders. The second part of the general introduction deals with pathogenetic trauma models, especially cognitive trauma models. The third part defines dysfunctional PTCs and introduces measures available for children and adolescents. Afterwards, the current state of research on predictors of dysfunctional PTCs is discussed, highlighting research gaps. The last part illustrates the relations between dysfunctional PTCs and psychological symptoms. Again, research gaps are elucidated.

The second chapter displays the empirical studies subsumed in this thesis. Firstly, the aims of this thesis are described. Secondly, the general methods of all studies included are summarized. Thirdly, the four studies are presented.

The third chapter presents the general discussion of the thesis. This part reflects on the empirical findings and study procedures. Furthermore, it discusses considerations for future research and clinical practice and finally draws general conclusions.

1 Traumatic Events and Maltreatment

This chapter includes the definition and incidence of TEs and maltreatment experiences and provides an overview of their psychological consequences in children and adolescents.

1.1 Definition of Traumatic Events and Maltreatment

The term *trauma* is widely used in everyday language for a broad range of events, including minor inconveniences. However, the clinical definition of TEs does not mean any kind of adverse experience; it defines a TE as exposure to actual or threatened death, serious injury, or sexual violence (as in the latest *Diagnostic and Statistical Manual of Mental Disorders* 5th edition; APA, 2013; A-criterion of the posttraumatic stress disorder; PTSD). Notably, the rather subjective term "threatened" applies not only to death but also to serious injury and sexual violence. This provides the potential to include subjectively, but not necessarily objectively, threatening events (De Young & Landolt, 2018). A TE can be experienced directly, witnessed in person, or through learning that the event occurred to a close family member or friend. Furthermore, repeated or extreme exposure to aversive details of TEs due to one`s profession (e.g. police officers) also falls within this definition. The 11th Revision of the *International Classification of Diseases* (WHO, 2018) defines psychological trauma similarly: as exposure to an extremely threatening or horrific event.

Events that meet the trauma definition can be sub-classified by frequency and cause. Defining frequency, Terr (1991) specified that a Type I trauma is an acute, unpredictable, and single event. In contrast, a Type II trauma happens repeatedly and can be predictable. The second distinction differentiates between accidental and interpersonal TEs (Landolt, 2012), such as road traffic accidents (RTAs) vs. sexual abuse.

Maltreatment includes sexual abuse, physical abuse, and witnessing violence at home. Furthermore, emotional abuse and physical and emotional neglect are subsumed within the concept of maltreatment (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008). Therefore, the definitions of TEs and maltreatment overlap for sexual abuse, physical abuse, and witnessing violence at home. Maltreatment can be classified as interpersonal and repeated exposure (Type II trauma).

1.2 Prevalence Rates of Traumatic Events and Maltreatment in Children and Adolescents

Many children experience a TE or maltreatment in their childhood or adolescence, but it has been difficult to specify exact prevalence rates (Gunaratnam & Alisic, 2017). The reasons for this are multilayered and can be categorized under three broad headings (Gunaratnam & Alisic, 2017; Klein & Alexander, 2009; Prevoo, Stoltenborgh, Alink, Bakermans- Kranenburg, & IJzendoorn, 2017):

- Participants (geographical location of a study, economic development of the country, respondent, type of sample)
- Sampling (sampling procedure, response rate, sample size)
- Measurement (instrument validated, definition of TEs and maltreatment, type of instrument, number of questions)

German studies describe prevalence rates of TEs of 22.5% in an adolescent sample between 12 and 17 years (Essau, Conradt, & Petermann, 1999) and of 21.2% for adolescents and young adults between 14 and 24 years (Perkonigg, Kessler, Storz, & Wittchen, 2000). A recent Swiss study with 9th graders described a markedly higher prevalence rate of 56.1% (Landolt, Schnyder, Maier, Schoenbucher, & Mohler-Kuo, 2013). Two studies from the United States also found higher prevalence rates: Copeland, Keeler, Angold, and Costello (2007) report that 67.8% of children and adolescents aged 9 to 16 years had experienced a TE, whereas Giaconia et al. (1995) found a lifetime prevalence rate of 43.0% in their 18-year-old participants. The most common reported TEs across these studies were violence, serious accidents, natural disasters, and the witnessing or news of another's sudden death or experience of serious accident.

Two German studies focusing on childhood maltreatment report prevalence rates between 1.6% and 10.8% for the different maltreatment types (Häuser, Schmutzer, Brähler, & Glaesmer, 2011; Witt, Brown, Plener, Brähler, & Fegert, 2017). Both these studies identified physical and emotional neglect as the most common maltreatment types. A Swiss study by Schick et al. (2016) found maltreatment rates between 2.8% and 26.5%, with physical and emotional abuse most frequent. The WHO (2013) reported that in Europe the prevalence rates for sexual abuse was 13.4% for girls and 5.7% for boys, 22.9% for physical abuse, and 29.1% for emotional abuse for both sexes. They also found that, worldwide, between 16.3 and 18.4% of children and adolescents experienced neglect.

1.3 The Psychological Impact of Traumatic Events and Maltreatment in Children and Adolescents

This chapter provides a brief overview of psychological disorder associated with TEs and maltreatment in childhood and adolescence. PTSD is described in detail.

1.3.1 Overview

The psychological impact of TEs and maltreatment differs from child to child. Some children cope well with the TE and do not show clinically relevant distress (Le Brocque, Hendrikz, & Kenardy, 2010). Other children display a variety of problems from both the internalizing and externalizing spectra (Goldbeck & Jensen, 2017). Furthermore, specific trauma-related disorders have been proposed in the classification systems (see Table 1).

Table 1

Trauma- and stressor-related disorders (DSM-5) and disorders specifically associated with stress (ICD-11)

DSM-5 code	**DSM-5 (APA, 2013)**	**ICD-11 code**	**ICD-11 (WHO, 2018)**
308.3	Acute stress disorder	---	*Non-disorder phenomenon*: acute stress reaction
309.x	Adjustment disorders	6B43	Adjustment disorder
309.81	Posttraumatic stress disorder With dissociative symptoms With delayed expression PTSD for children ≤ 6 years	6B40	Posttraumatic stress disorder
	---	6B41	Complex posttraumatic stress disorder
	---	6B42	Prolonged grief disorder
313.89	Reactive attachment disorder	6B44	Reactive attachment disorder
313.89	Disinhibited social engagement disorder	6B45	Disinhibited social engagement disorder
309.89 309.9	Other specified/ unspecified trauma- and stressor related disorders	6B4Y 6B4Z	Other specified/ unspecified disorders specifically associated with stress

The classification systems differ in both the disorders and their symptoms. For example, within the acute phase after trauma (up to one month posttrauma) the DSM-5 proposes *acute stress disorder* (ASD), whereas the ICD-11 describes *acute stress reaction* as a non-disorder phenomenon. In both cases, the TE has to meet the A-criterion (see Chapter 1.1). The DSM-5 describes five categories: intrusion, negative mood, dissociation, avoidance, and arousal. The symptoms last between three days and one month. The ICD-11 considers the response to the stressor to be normal given the severity of the stressor. The acute stress reaction includes transient emotional, somatic, cognitive, or behavioural symptoms that subside within a few days after the event or after removal from the threatening situation.

Furthermore, both classification systems mention *adjustment disorders*. The DSM-5 describes the development of emotional and behavioural symptoms in response to an identifiable stressor within 3 months of the onset of the stressor. The ICD-11 mentions a maladaptive reaction to an identifiable psychosocial stressor characterized by preoccupation with the stressor or its consequences, including excessive worry, recurrent and distressing thoughts, and constant rumination. In both cases, symptoms are clinically significant and do not persist for more than 6 months.

Attachment disorders are defined similarly in the DSM-5 and the ICD-11. *Reactive attachment disorder* comprises a consistent pattern of inhibited, emotionally withdrawn behaviour toward adult caregivers and persistent social and emotional disturbance. *Disinhibited social engagement disorder* is characterized by a pattern of indiscriminately approaching adults and exhibiting overly familiar behaviour towards strangers. Both disorders originate from social neglect or deprivation, including institutional deprivation.

In addition to the disorders mentioned before, the ICD-11 proposes a new disorder called *prolonged grief disorder*. The disorder is characterized by a persistent and pervasive grief response for an abnormally long period of time. This leads to a significant impairment in personal, family, social, educational, occupational or other important areas of functioning.

1.3.1.1 Posttraumatic Stress Disorder in DSM-5 and ICD-11

The latest versions of the DSM and the ICD differ in the diagnosis of the PTSD. Compared to the DSM-IV, the DSM-5 has a new cluster called *negative alterations in cognitions and mood* alongside the existing clusters (re-experiencing, avoidance, hyperarousal). Alterations in cognitions include symptom D2 *persistent and exaggerated negative beliefs or*

expectations about oneself, others, or the world (e.g., "I am bad," "No one can be trusted," "The world is completely dangerous," "My whole nervous system is permanently ruined") and symptom D3 *persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others*. An advantage of this rather broad PTSD construct is its more comprehensive description of the disorder's symptomatology (Brewin et al., 2017). However, as a result, PTSD has become rather unspecific, with over half a million different combinations of symptoms possible (Galatzer-Levy & Bryant, 2013).

In contrast, the ICD-11 presents a more specific diagnosis that focuses only on (1) re-experiencing in the form of vivid intrusive images or memories, flashbacks, or repetitive dreams or nightmares, (2) avoidance, and (3) a heightened sense of threat (Brewin et al., 2017; WHO, 2018). These symptoms might best discriminate PTSD from other disorders (Brewin et al., 2017). Hence, this description enables non-specialists more easily to confidently identify and diagnose PTSD. Studies in (young) children and adolescents have shown lower PTSD prevalence rates for ICD-11 than DSM-5 (Sachser et al., 2018; Vasileva, Haag, Landolt, & Petermann, 2018).

Table 2 displays similarities and differences in both diagnostic criteria systems (cf. Goldbeck & Jensen, 2017, pp. 15-16). Notably, the final conceptualization of ICD-11 PTSD re-experiencing symptoms in research studies has not yet been released. This has led to different approaches in conceptualizing re-experiencing symptoms in research studies. Some studies, for example, used only *flashbacks* and *nightmares* (Hansen, Hyland, Armour, Shevlin, & Elklit, 2015; Sachser et al., 2018); some also included *intrusive memories* and *psychological distress* (Knefel, Tran, & Lueger-Schuster, 2016). However, the ICD-11 text states that "re-experiencing the traumatic event or events in the present in the form of vivid intrusive memories, flashbacks, or nightmares, which are typically accompanied by strong and overwhelming emotions such as fear or horror and strong physical sensations, or feelings of being overwhelmed or immersed in the same intense emotions that were experienced during the traumatic event" (WHO, 2018). Furthermore, Brewin et al. (2017) describes how, in cases of amnesia, emotional distress related to cues might be used instead of involuntary memories. Due to the uncertainty, Table 2 mentions the symptoms of the re-experiencing cluster in text form.

Table 2

Posttraumatic stress disorder as defined in DSM-5 and ICD-11 (mod. from Goldbeck and Jensen, 2017, pp. 15-16)

DSM-5 (age > 6 years)			**ICD-11**
A	*Exposed to* threatened death, serious injury or sexual violence Experienced/witnessed threat to life or sexual violence Learning events occur to close other person	A	*Exposed to* extremely threatening or horrifying event or series of events
B	*Reexperiencing (at least one)*	1	*Reexperiencing (at least one)*
B1	Intrusive memories		Vivid intrusive memories, flashbacks, or nightmares, which are typically accompanied by strong and overwhelming emotions and strong physical sensations, or feelings of being overwhelmed or immersed in the same intense emotions that were experienced during the traumatic event
B2	Nightmares		
B3	Flashbacks		
B4	Distress to reminders		
B5	Physiological reactivity		
C	*Avoidance (at least one of)*	2	*Avoidance (at least one)*
C1	Thoughts and feelings	a	Thoughts and memories
C2	Situations	b	Activities or situations
D	*Negative alterations in cognitions/ mood (at least three)*		
D1	Dissociative amnesia		
D2	Negative expectations of self/world		
D3	Distorted blame		
D4	Negative emotional state		
D5	Diminished interest		
D6	Emotional numbing		
E	*Hyperarousal (at least two)*	3	*Perceived threat (at least one)*
E1	Irritability and angry outbursts		
E2	Reckless/self-destructive		
E3	Hypervigilance	a	Hypervigilance
E4	Startle response	b	Startle response
E5	Concentration deficits		
E6	Sleep problems		

	Duration: >1 month after trauma		Duration: at least several weeks
	Significant impairment		Significant impairment
Specifier: with dissociative symptoms			
Specifier: with delayed expression			

1.3.1.1.1 Complex Posttraumatic Stress Disorder in ICD-11

The ICD-11 proposes a new trauma-related disorder called *complex posttraumatic stress disorder* (complex PTSD). In addition to the core symptoms of PTSD, complex PTSD is characterized by 1) severe and pervasive problems in affect regulation; 2) persistent beliefs about oneself as diminished, defeated or worthless, accompanied by deep and pervasive feelings of shame, guilt or failure related to the traumatic event; and 3) persistent difficulties in sustaining relationships and in feeling close to others (WHO, 2018). Maercker et al. (2013) suggest that the DSM-5 PTSD diagnosis is positioned between the ICD-11 PTSD diagnosis and the ICD-11 complex PTSD diagnosis.

1.3.1.1.2 Prevalence of Posttraumatic Stress Disorder in Children and Adolescents

Studies of the general population of adolescents and young adults describe prevalences of PTSD (DSM-IV criteria) between 1.3% and 4.2% in Germany and Switzerland (Essau et al., 1999; Landolt et al., 2013; Perkonigg et al., 2000). Prevalences for those exposed to trauma varies between 7.3% and 7.8% in these studies. Alisic et al.'s (2014) meta-analysis, which included 43 international samples of children and adolescents aged between 2 and 18 years exposed to TEs, reported a mean prevalence rate of 15.9% (95% confidence interval (CI) 11.5%-21.5%). The prevalence rates of the studies included in the meta-analysis ranged from 0 to 89%. Methodological differences might explain some of this heterogeneity, as might sample characteristics, for example, female sex and exposure to interpersonal TEs as a risk factor for developing PTSD (Alisic et al., 2014). A recent meta-analysis by Dai et al. (2018) investigated the prevalence rates of children and adolescents exposed to RTAs and found a prevalence rate of PTSD of 19.95% (95% CI 13.6%-27.1%). Again, the heterogeneity across the studies included was high.

1.3.1.1.3 Comorbidity with Posttraumatic Stress Disorder

Depending on the age and developmental state of the child or adolescent, different comorbid diagnoses have to be considered. Common comorbid diagnoses associated with PTSD include separation anxiety, dissociation, depression, substance abuse, externalizing problems, non-suicidal self-injury, and suicidality (Essau et al., 1999; Keane & Kaloupek, 1997; Pfeiffer, Sachser, & Goldbeck, 2017; Steil & Rosner, 2013). Children and adolescents who have experienced traumatic events multiple times, often from a young age, can show a pattern of consecutive disorders: As toddlers by regulatory problems, followed in preschool age by attachment disorders (see 1.3.1.1); in school-age conduct disorders, followed in adolescence by a combination of conduct and emotional disorders (see Schmid, Petermann, & Fegert, 2013). In addition to the established diagnoses, a *developmental trauma disorder* (DTD; van der Kolk, 2005; van der Kolk et al., 2009) has been discussed for the DSM-5. DTD contains dysregulation of attention and behaviour, difficulties with self-regulation and relationships, and PTSD symptoms. However, the DSM-5 eventually did not include the DTD, because more research still needs to be conducted. In conclusion, many children and adolescents experience TEs or maltreatment. However, the consequences of these adverse events differ greatly. Pathogenetic trauma models have been developed to better explain differences in trauma adjustment.

2 Pathogenetic Trauma Models

To show the complexity of trauma adjustment, this chapter starts with the *Transactional Model of Coping with Trauma* by Landolt (2012). Afterwards, cognitive trauma theories that are specifically relevant for this thesis are described in detail. In addition, two cognitive models relevant for this thesis and developed in depression research are briefly introduced.

2.1 Transactional Model of Coping with Trauma

The Transactional Model of Coping with Trauma by Landolt (2012) stresses the interdependency between the characteristics of the trauma, the individual, and the social environment. These factors do not act independently but instead interact with each other. Depending on their manifestations, they might serve as either a risk or a protective factor. Those characteristics can have a direct effect on the posttraumatic symptomatology or indirectly via posttraumatic appraisals and coping behaviour (see Figure 1).

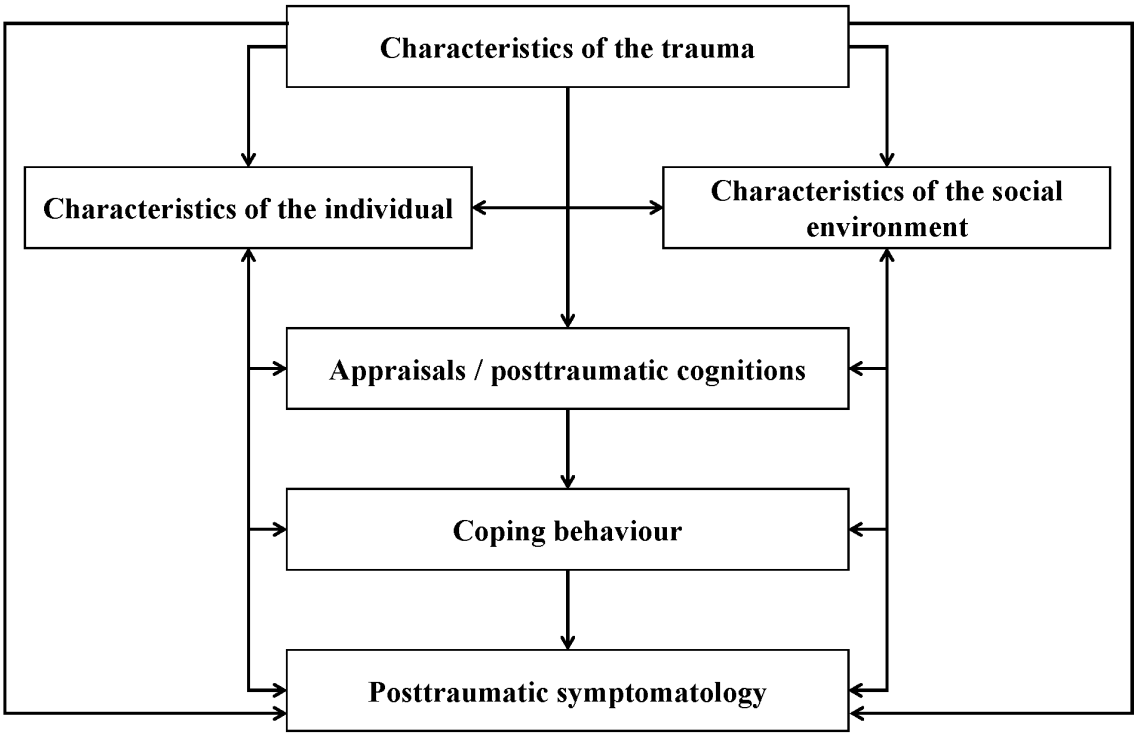

Figure 1. Transactional Model of Coping with Trauma (Landolt, 2012)

Characteristics of the trauma include variables such as frequency of traumatic exposure (e.g. Type I vs. Type II) and type of TE (e.g. interpersonal vs. accidental). Characteristics of the individual can include age, sex, personality, prior psychopathological problems, and neurobiological vulnerability. Characteristics of the social environment might include perceived support by parents and peers, family climate, and the mental health of the parents. Based on Landolt`s (2012) trauma model, these characteristics of the child and the social environment impact the posttraumatic symptomatology, either directly or indirectly via appraisals or posttraumatic cognitions. Dysfunctional PTCs regarding the self and the world, for example, have been found to correlate strongly with internalizing and externalizing problems (Hiller, Creswell, et al., 2018; Liu & Chen, 2015) and seem to play a crucial role in persistent PTSD. Lastly, coping behaviour needs to be taken into account. However, distinguishing between symptoms and coping strategies can be difficult (for example, in terms of avoidance; Landolt, 2012; Stallard, Velleman, Langsford, & Baldwin, 2001). Specific cognitive trauma theories or models have been developed to explain the impact of cognitive factors in trauma adjustment.

2.2 Cognitive Trauma Models

This chapter describes two early cognitive trauma models, *Stress Response Theory* and *Shattered Assumptions*, and two current ones, *Emotional Processing Theory* and the *Cognitive Model of Posttraumatic Stress Disorder.*

2.2.1 Earlier Theories

Horowitz's Stress Response Theory (2011) is the basis for later cognitive theories. It combines psychodynamic and cognitive components. The adjustment process entails four phases (p. 78):

1. Phase of initial realization of the trauma, often accompanied by strong reactive emotions
2. Phase of denial, numbing, avoidance, and/or inhibitions
3. Mixed phase of denial and intrusive repetition in thought, emotion, and/or behaviour
4. Further ideational and emotional processing, working through, and acceptance leading towards equilibrium and reduced intrusions, avoidance, and hyperarousal

Phase 4 requires that pre-trauma and post-trauma information are integrated into an updated schema. Traumatic experiences, therefore, demand a fundamental revision of schema regarding the self, relationships, and the world.

Another early theory about Shattered Assumptions by Janoff-Bulman (1985) focuses on assumptions about the self (the self is worthy), and about others and the world (the world is benevolent, the world is meaningful). A traumatic experience can shatter these assumptions, leading to a perception of oneself as vulnerable, damaged, and worthless and the world as scary, unpredictable, and unfair (Maercker, 2013).

These early theories are still in line with the current state of the research and have played an important role in explaining the development and maintenance of PTSD (Brewin & Holmes, 2003). Despite this, Brewin and Holmes (2003) argue that the assumption that pre-trauma schemata are positive and the psychological distress originates from them being shattered by the TE is problematic. This would mean that people who have experienced TEs before should not have a problem integrating recent TEs, since their positive assumptions regarding their self and the world had already been shattered. However, this is in contrast to research findings on the proposed dose-response relationship, which state that experiencing different trauma types or prolonged TEs/maltreatment is more likely to lead to PTSD (Arata, Langhinrichsen-Rohling, Bowers, & O'Farrill-Swails, 2005; Salazar, Keller, & Courtney, 2011).

2.2.2 Recent Theories

The Emotional Processing Theory by Foa and Rothbaum (1998) and the Cognitive Model of Posttraumatic Stress Disorder by Ehlers and Clark (2000) are well-established and especially relevant to research on dysfunctional PTCs.

2.2.2.1 Emotional Processing Theory

The Emotional Processing Theory (Foa & Rothbaum, 1998) integrates aspects from learning, personality, and cognitive theories. A trauma memory structure entails stimulus elements, response elements, and meaning elements. A pathological trauma's memory structure involves "excessive response" elements such as avoidance, escape, and physiological activity. It also includes erroneous stimulus–stimulus associations that do not accurately represent the world. For example, bald man or suburbs are perceived as dangerous. In addition, harmless stimuli are associated with escape and avoidance responses. Since a pathological trauma memory structure often includes a large number of stimulus elements, including such erroneous associations, this leads to the perception of the world as extremely dangerous. Moreover, erroneous associations with one's own role and behaviour in the TE prime an evaluation of oneself as incompetent. Taken together, people have the feeling that the world is extremely dangerous and that they are not able to protect themselves.

Salmon and Bryant (2002) argue that it is unclear whether the emotional processing theory can account for childhood PTSD. However, they indicate that various developmental factors need to be considered: Firstly, the TE needs to be understood as threatening; only then is it possible that a discrepancy occurs between trauma-related information and pre-existing cognitive schema. Secondly, the fear network is associated with the individual's ability to understand his or her own emotions and to regulate high levels of emotions. Thirdly, the influence of contextual factors on the child's response to TEs also need to be considered in cognitively focused theories.

2.2.2.2 Cognitive Model of Posttraumatic Stress Disorder

The most established model is the Cognitive Model of Posttraumatic Stress Disorder by Ehlers and Clark (2000), which is based on the cognitive models described above. Figure 2 displays its various elements. The background factors are characteristics of the TE and of the individual. These influence the cognitive processing during TE, the trauma memory, appraisals,

and control strategies. For example, the predictability of a TE such as an RTA might be more difficult to process when one is suddenly hit and did not see the car coming. Furthermore, prior beliefs might be important for the cognitive processing of the TE. Comparable to Horowitz's Stress Response Theory (2011) and Janoff-Bulman`s (1985) theory of Shattered Assumptions, someone who believes that no one can ever harm him might have more problems understanding and integrating the fact that he has been assaulted. Appraisals of the TE might be impacted by characteristics of the TE itself, such as the absence of perceived control during the TE. Experiencing loss of control might encourage misconceptions about one's control over one's life in general. Besides, a TE that leads to permanent health problems might encourage appraisals that one's life has been permanently damaged by the TE. The control strategies might also be impacted by prior beliefs. Thought suppression may be more likely used by people who believe or have experienced showing emotions to be a sign of weakness.

Cognitive processing, in turn, influences the trauma memory and trauma-related appraisals. Mental defeat during the TE, meaning the perceived loss of all psychological autonomy accompanied by the feeling of no longer being human, might be more likely lead to a negative view of oneself, for example not being able to cope with stress. Furthermore, cognitive processes impact the trauma memory. It is important to process the TE in an organized way and place it into context (*conceptual processing*). If instead mainly *data-driven processing* happens, meaning the processing of the sensory impressions, memories of the TE will be relatively difficult to retrieve intentionally and relatively strong perceptual priming will exist for accompanying stimuli. Figure 2 displays the interplay of the various aspects.

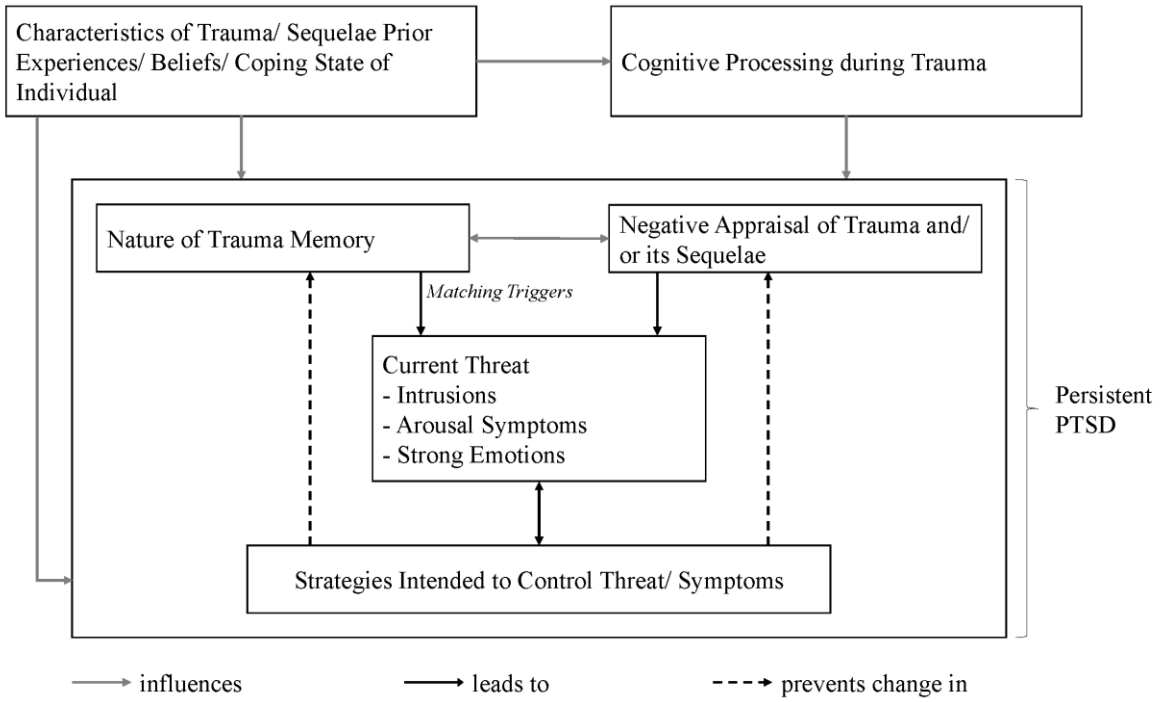

Figure 2. Cognitive Model of Posttraumatic Stress Disorder (Ehlers & Clark, 2000, p. 321)

PTSD = posttraumatic stress disorder.

The feeling of a current threat is central in this model, although there is nothing to be afraid of anymore, because the frightening event happened in the past. This phenomenon can be explained by two key mechanisms. The first involves individual differences in appraising the TE itself and/or its sequelae: Appraising the TE and its consequences as extremely dangerous leads to a feeling of current threat and triggers intrusions, arousal symptoms, and strong emotions. In order to protect oneself, coping strategies are used that stop these symptoms for a short period of time. In the long term, however, they prevent cognitive change and maintain the symptoms (see Figure 2). For example, appraisals such as *If I think about the trauma, I will go mad or fall apart* might lead to dysfunctional strategies such as trying not to think about the TE, keeping one's mind occupied at all times, drinking alcohol, or taking drugs.

The second key mechanism involves individual differences in the nature of the memory for the TE and its link to other autobiographical memories: If the TE is not processed properly in memory, various triggers may lead to intrusions, arousal symptoms, and strong emotions (see Figure 2). The interplay of various trauma characteristics, trauma memory, appraisals, and coping behaviour sustains posttraumatic stress symptoms (PTSS). The two processes interact. The appraisals influence what kind of information is remembered. In turn, selective memories hinder the processing of information that could correct misconceptions. Furthermore, distorted

or incomplete memories foster the feeling that something is seriously wrong with oneself due to the TE.

People try to control the feeling of a current threat and the accompanying symptoms through a range of strategies. Unfortunately, dysfunctional strategies are often used, and these maintain PTSS by three mechanisms (pp. 328-330):

1) Directly producing PTSS (e.g. thought suppression increases the frequency of unwanted intrusive recollection)
2) Preventing change in negative appraisals of the TE and/or its sequelae (e.g. safety behaviours prevent the disconfirmation of the belief that something bad would happen if one does not engage in preventative action)
3) Preventing change in the nature of the trauma memory (avoidance prevent the formation of elaborate trauma memory)

Brewin and Holmes (2003) argue that Ehlers and Clark's (2000) Cognitive Model of Posttraumatic Stress Disorder provides the most detailed account of the maintenance of PTSS. Moreover, key components such as appraisals and cognitive coping factors have been consistently supported by empirical research. Measuring trait or spontaneous trauma processing and investigating cognitive processing have been found to be difficult. Therefore, open questions remain, for example, regarding the distinction between data-driven and conceptual processing. Another aspect that is relevant for this thesis is whether this model, which was developed for adults, can be used to explain differences in children and adolescents. Several studies have supported its adaptability to childhood and adolescence (Ehlers, Mayou, & Bryant, 2003; Meiser-Stedman, 2002; Stallard, 2003). Another important issue to consider is the broad age range of children and adolescents (6 to 18 years) included in this thesis. Studies investigating the reliability of dysfunctional PTCs did not find differences due to age (de Haan, Petermann, Meiser-Stedman, & Goldbeck, 2016; Meiser-Stedman, Smith, et al., 2009). Paz-Alonso, Larson, Castelli, Alley, and Goodman (2009) argue that in addition to age demographic, cognitive and emotional factors play an important role in how a trauma is appraised. Smith, Perrin, Yule, and Clark (2010) mention that although the content might differ, subjective appraisals of the TE are as important in children as in adults. Bolton (2005; as cited in Smith et al., 2010) also makes clear that whether appraisals play a role in maintaining PTSS in individual cases should be considered rather than concentrating on developmental differences between children and adults in general. If appraisals play a role, then they need to be addressed in therapy, irrespective of the child's age or developmental status.

2.3 Cognitive Models Developed in Depression Research

In addition to trauma models, models developed in depression research are relevant for this thesis as well. Two theoretical models addressing the causal relationship between cognitions and symptoms are the *Cognitive Scar Model* (Lewinsohn, Steinmetz, Larson, & Franklin, 1981) and the *Cognitive Vulnerability Model* (Hankin & Abramson, 2002). The Cognitive Scar Model (Lewinsohn et al., 1981) suggests that preceding depression adversely impacts cognitions. Transferring this to PTSD means that PTSS trigger an increase in dysfunctional PTCs (Shahar, Noyman, Schindel-Allon, & Gilboa-Schechtman, 2013). In contrast, the Cognitive Vulnerability Model (Hankin & Abramson, 2002) suggests that depression and PTSD can be explained by preceding cognitive vulnerability; in other words, dysfunctional PTCs drive posttraumatic symptomatology. Notably, these models are not mutually incompatible (Mezulis, Funasaki, Charbonneau, & Hyde, 2010; Shahar & Henrich, 2010). Although Ehlers and Clark`s (2000) cognitive model of posttraumatic stress disorder focuses mainly on the concept of cognitive vulnerability (PTCs → PTSS), it also mentions a reciprocal relationship: One's PTSS might be interpreted as indications that one has changed permanently for the worse or as indicators of a threat to one's physical or mental well-being.

Research on the superiority of one or the other of these models is inconsistent. Palosaari, Punamaki, Diab, and Qouta (2013), for example, backed the cognitive vulnerability model by showing that levels of and changes in dysfunctional PTCs at baseline significantly predicted later levels and changes in PTSS in children aged 10 to 12 years. PTSS, on the other hand, did not significantly predict later dysfunctional PTCs. A study with adults by Shahar et al. (2013) likewise reported that baseline dysfunctional PTCs, namely negative cognitions about self, predicted later PTSS. However, Shahar et al. (2013) also found that PTSS predicted later dysfunctional PTCs. The latter finding is in line with the Cognitive Scar Model. Taking both findings together supports the assumption that both models are not necessarily mutually incompatible. One study in line with the Cognitive Scar Model was conducted with adults by Dekel, Peleg, and Solomon (2013). They demonstrated that initial PTSS predicted subsequent dysfunctional PTCs but not vice versa.

In addition to these inconsistent research findings, sex and age might be important in children and adolescents. Ross and Kearney's (2015) study on maltreated youths found that, especially in older youths, dysfunctional PTCs were associated with heightened PTSS. Studies on depression have shown that cognitive vulnerability explained the higher prevalence of depression in female adolescents (Calvete & Cardeñoso, 2005; Hankin & Abramson, 2002). However, Mezulis et al (2010) reported that sex differences in depressive symptoms emerged

prior to gender differences in cognitive vulnerability in their sample of children and adolescents, which supports the Cognitive Scar Model.

Taken together, despite the inconsistent findings in research on PTSS and depression in children and adolescents, these models might be able to add new insight into the relationship between dysfunctional PTCs and psychological symptoms in children and adolescents exposed to TEs and/or maltreatment.

3 Dysfunctional Posttraumatic Cognitions

Dysfunctional PTCs have been addressed in both research and treatment. This section defines them more closely, describes measures, and provides an overview of the current state of research about predictors of dysfunctional PTCs and their relation with psychological symptoms in children and adolescents, directly highlighting research gaps.

3.1 Definition

Dysfunctional PTCs are considered to emerge as a reaction to a TE. The TE itself and its consequences are appraised extremely negatively. The PTCs are called *dysfunctional* PTCs, because in line with the Cognitive Model of Posttraumatic Stress Disorder by Ehlers and Clark (2000) they lead to a feeling of current threat. This feeling in turn triggers short-term coping behaviours that in the long term prevent cognitive change and cause the symptoms to persist. Research has mainly focused on dysfunctional PTCs regarding the self (I am an incompetent person, I will never be the same again), the world (the world is a scary place where I am highly vulnerable), and self-blame/guilt.

3.2 Measures

Some measures exist for children that either assess illness-related appraisals (Vollrath, Landolt, & Ribi, 2004) or appraisals related to sexual abuse (*Children's Attributions and Perceptions Scale*; Mannarino, Cohen, & Berman, 1994; *Negative Appraisals of Sexual Abuse Scale*; Spaccarelli, 1995).

Dysfunctional PTCs can be found in PTSD measures. DSM-IV measures for example, included questions regarding the sense of a foreshortened future and self-blame (e.g. *University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index*; UCLA PTSD-RI;

Steinberg, Brymer, Decker, & Pynoos, 2004). Nowadays, with the inclusion of dysfunctional PTCs in the DSM-5 PTSD criteria (see 1.3.1.2), PTSD measures assess dysfunctional PTCs regularly. Furthermore, measures have been developed to specifically assess these dysfunctional PTCs in greater depth. Together with Foa and colleagues, Ehlers and Clark, developed the *Post-Traumatic Cognitions Inventory* (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999), a questionnaire that consists of 36 items addressing dysfunctional PTCs regarding the self, the world, and self-blame. Meiser-Stedman, Smith, et al. (2009) adapted this questionnaire for school-aged children and adolescents in the *Child Post-Traumatic Cognitions Inventory* (CPTCI). It contains 25 items, divided into two subscales: *permanent and disturbing change* and *fragile person in a scary world*. Items regarding self-blame are not included. The author of this thesis validated the German version of the CPTCI (CPTCI-GER; de Haan et al., 2016).

The following chapters describe the current state of research in children and adolescents using the CPTCI, starting with research on predictors of dysfunctional PTCs, followed by findings on their relations with psychological symptoms. Although using the same CPTCI measure, various research groups have used such terms as negative appraisals, maladaptive appraisals, negative cognitions, dysfunctional posttraumatic cognitions, trauma-related cognitions, and appraisals. In order to make clear that all the findings originated from the CPTCI, the study results are referred to throughout as dysfunctional PTCs.

3.3 Predictors of Dysfunctional Posttraumatic Cognitions

Table 3 provides an overview of the variables investigated as possible predictors in studies using the CPTCI in school-aged children and adolescents. Findings especially relevant to this thesis are also highlighted in the text. In line with Landolt's (2012) Transactional Model of Coping with Trauma, predictors that were investigated can be divided into trauma, child, and social characteristics:

Trauma characteristics. Liu and Chen (2015) reported that the quantity of dysfunctional PTCs differed with the trauma type. Children and adolescents exposed to an RTA and interpersonal trauma had higher scores than the ones exposed to a medical trauma and natural disaster. Meiser-Stedman, Smith, et al. (2009) observed that children after an assault reported significantly more dysfunctional PTCs than children after an RTA. Palosaari et al. (2013)

discovered that time since trauma had an impact, since dysfunctional PTCs decreased from 3 months to 5 months but stayed about the same from 5 months to 11 months.

Child characteristics. Age and sex were investigated as child characteristics, with mixed results. Firstly, female children and adolescents reported more dysfunctional PTCs in two studies (Diehle, de Roos, Meiser-Stedman, Boer, & Lindauer, 2015; Meiser-Stedman, Smith, et al., 2009), but Lobo et al. (2015) did not find any sex differences. Secondly, Diehle et al. (2015) and Meiser-Stedman, Smith, et al. (2009) did not find an age effect, whereas Lee et al. (2018) reported that older age was associated with higher levels of dysfunctional PTCs in sexually abused children and adolescents. Notably, 93.7% of Lee et al.'s sample were female participants.

Social characteristics, In terms of social characteristics, social support was found to negatively impact dysfunctional PTCs (Hitchcock, Ellis, Williamson, & Nixon, 2015; Münzer, Ganser, & Goldbeck, 2017). Furthermore, children and adolescents who received trauma-focused treatment showed significantly decreased levels of dysfunctional PTCs (Diehle et al., 2015; Goldbeck, Muche, Sachser, Tutus, & Rosner, 2016; Nixon, Sterk, & Pearce, 2012).

Although the Transactional Model of Coping with Trauma (Landolt, 2012) stresses the fact that risk or protective factors interact with each other, the detailed list in Table 3 makes clear that only one study exists that investigated several predictors in a multivariate design. Palosaari, Punamäki, Peltonen, Diab, and Quota (2016) found that war trauma, parental psychological maltreatment, sibling conflict, and loneliness among peers predicted PTCs in their sample of 10 to 12 year old participants from the Gaza strip.

In summary, only a few studies have focused on predictors of dysfunctional PTCs so far, and these have mainly explored single predictors of dysfunctional PTCs in children and adolescents. Variables such as trauma type, sex, social support, and receiving treatment impacted dysfunctional PTCs in children and adolescents. Studies considering the reciprocal relationships between trauma, child, and social characteristics are needed. Furthermore, studies that investigate a possible mediating role of dysfunctional PTCs, risk factors, and psychological symptoms seem promising.

3.4 Associations between Dysfunctional Posttraumatic Cognitions and Psychological Symptoms

Table 3 displays studies in school-aged children on associations between dysfunctional PTCs and psychological symptoms. Again, findings especially relevant to this thesis are

additionally highlighted in the text. In line with the Cognitive Model of Posttraumatic Stress Disorder (Ehlers & Clark, 2000), across all studies, dysfunctional PTCs were positively associated with PTSS, depression, and anxiety in children and adolescents exposed to TEs (for example, Diehle et al., 2015; Meiser-Stedman, Smith, et al., 2009). Longitudinal studies reported that dysfunctional PTCs were a stronger predictor of PTSD six months post trauma than other variables such as injury severity, age, and an ASD diagnosis within the first month posttrauma (Bryant, Salmon, Sinclair, & Davidson, 2007). Mixed results were found for the PTCs as mediators between acute and chronic PTSS (without treatment; Liu & Chen, 2015; Meiser-Stedman, Dalgleish, Glucksman, Yule, & Smith, 2009; Palosaari et al., 2013). Treatment studies reported that a decrease in PTSS level from pre-intervention to post-intervention was mediated by changes in dysfunctional PTCs in children and adolescents (Meiser-Stedman, Smith, et al., 2017; Pfeiffer, Sachser, de Haan, Tutus, & Goldbeck, 2017).

Studies investigating the Cognitive Vulnerability Model (dysfunctional PTCs → PTSS; Hankin & Abramson, 2002) and the Cognitive Scar Model (PTSS → PTCs; Lewinsohn et al., 1981) in children and adolescents are rare. This is why the directionality of effects of dysfunctional PTCs and psychological symptoms has largely remained unclear. The only study that investigated this question used a cross-lagged panel design in a very specific sample of 10-12 year old children exposed to war trauma in the Gaza strip (Palosaari et al., 2013; Palosaari et al., 2016). This study found that levels of and changes in dysfunctional PTCs at baseline significantly predicted later levels and changes in PTSS but not vice versa. Notably, studies in adults either reported reciprocal associations (Shahar et al., 2013) or that initial PTSS predicted subsequent dysfunctional PTCs but not vice versa (Dekel et al., 2013). Further studies are needed to investigate the directionality of effects in children and adolescents exposed to TEs and maltreatment experiences.

Furthermore, studies on the relationship between dysfunctional PTCs and psychological problems have mostly used single-incident trauma samples; children and adolescents exposed to multiple or prolonged TEs and maltreatment are underrepresented (see Table 3).

Finally, in contrast to much research on the association between dysfunctional PTCs and internalizing problems, little work has been done on the relationship between dysfunctional PTCs and externalizing problems. Just a few studies have addressed the association between externalizing problems and dysfunctional PTCs, but these have shown positive associations (for example, Hiller, Creswell, et al., 2018; Leeson & Nixon, 2011; Liu & Chen, 2015).

Table 3

Overview of studies using the Child Post-Traumatic Cognitions Inventory in school-aged children

Authors	Sample	*N*	Trauma type	Predictors of dysfunctional PTCs	Relations of dysfunctional PTCs with psychological symptoms
Alberici et al., 2018	Clinical, emergency department, school	426	---		Dysfunctional PTCs predictor for PTSS.
Bryant et al., 2007	Emergency department	76	RTA, serious accidental injury, traumatic fall		Dysfunctional PTCs predictor for PTSD six months posttrauma controlled for injury severity, age, and an ASD diagnosis within the first month posttrauma.
de Haan et al., 2016	Clinical	223	Accidental, physical abuse, sexual abuse, violence outside the family, witnessing domestic violence, other	Children and adolescents with PTSD scored significantly higher on the total scale and on the subscales compared to those without PTSD.	Positive associations between dysfunctional PTCs and PTSS, depression, and anxiety; partial correlations (controlled for depression and anxiety, respectively) yielded substantially lower, still significant correlations.
Diehle et al., 2015	Clinical, school	502	Accidental, interpersonal, other	Females more dysfunctional PTCs; no age effect; children and adolescents who received trauma-focused treatment showed significantly decreased levels of dysfunctional PTCs.	Positive associations between baseline PTCs and PTSS, depression, and anxiety.
Ellis et al., 2009	Emergency department	97	RTA, serious accidental injury, traumatic fall, other	Children who had stronger beliefs that they were going to be seriously hurt or die during the TE had increased level of dysfunctional PTCs.	Positive association between dysfunctional PTCs and acute stress symptoms and depression.
Goldbeck et al., 2016	Clinical	159	Accidental, interpersonal	Children and adolescents who received trauma-focused treatment showed significantly decreased levels of dysfunctional PTCs.	

Hiller, Creswell, et al., 2018	Emergency department	132	Acute medical episode, assault, RTA, serious accidental injury, traumatic fall, other		Positive association between baseline dysfunctional PTCs and PTSS, anxiety, depression, and externalizing problems; positive association between change in dysfunctional PTCs over 6 months and change in PTSS and anxiety but not in depression and externalizing symptoms.
Hiller, Meiser-Stedman, et al., 2018	Emergency department	132	Acute medical episode, RTA, serious accidental injury, other	Pathway from parental dysfunctional PTCs (1-month posttrauma) to 6-month child PTSS via intervening child dysfunctional PTCs (3 months); indirect pathway from parental dysfunctional behavioural response to child PTSS via child dysfunctional PTCs.	
Hitchcock et al., 2015	Emergency department	79	RTA; serious accidental injury; traumatic fall; other	Social support was found to negatively impact dysfunctional PTCs.	Dysfunctional PTCs mediated the relationship between perceived social support and posttraumatic stress in the acute phase following trauma.
Lee et al., 2018	Clinical	237	Sexual abuse	Older age was associated with higher levels of dysfunctional PTCs; rape more dysfunctional PTCs compared to sexual abuse other than rape; high PTSD-risk group and the low PTSD-risk group showed significant differences; no significant differences in dysfunctional PTCs between acute and chronic group.	Positive association between dysfunctional PTCs and PTSS, depression, and anxiety; positive partial correlations between PTCs and PTSS, controlled for depression and anxiety.
Leeson & Nixon, 2011	Child welfare, school	50	Psychological maltreatment	Maltreated children differed significantly in dysfunctional PTCs from control group	Positive associations between dysfunctional PTCs and internalizing and externalizing problems; dysfunctional PTCs predicted PTSS, depression, and lower self-esteem
Liu & Chen, 2015	School	285	Accidental, natural disaster, interpersonal, medical trauma, other	Participants exposed to accidental and interpersonal TEs had higher dysfunctional PTCs scores than participants exposed to natural disasters and medical TEs.	Direct longitudinal effect of dysfunctional PTCs about permanent and disturbing change subscale on children's PTSS; no mediation between acute and chronic PTSS (without treatment)
Lobo et al., 2015	Clinical	131	Accidental, interpersonal	No age or gender differences	Positive associations between dysfunctional PTCs and PTSS and depression.

Marsac et al., 2017	Emergency department	96	Burns, RTA, serious accidental injury		Positive associations between dysfunctional PTCs and PTSS.
McKinnon et al., 2016	Clinical, emergency department	492	Assault, RTA, serious accidental injury	Children with a PTSD diagnosis scored higher than children without PTSD.	
Meiser-Stedman, Dalgleish, et al., 2009	Emergency department	59	Assault, RTA	Higher PTC score in youths with PTSD than without PTSD.	Dysfunctional PTCs mediated the association between acute and chronic PTSS (without treatment).
Meiser-Stedman, Smith, et al., 2009	Emergency department, school	570	Assault, RTA	Children after an assault reported significantly more dysfunctional PTCs than children after an RTA; females were found to have more dysfunctional PTCs; no age effect.	Positive associations between dysfunctional PTCs and PTSS, depression, and anxiety.
Meiser-Stedman, Smith et al., 2017	Clinical sample	29	Assault, medical emergency, house fire; RTA, other	The decrease in PTSS level from pre-to post-intervention was mediated by changes in dysfunctional PTCs.	
Münzer et al., 2017	Clinical	200	Abuse, neglect	Dysfunctional PTCs mediated the relation between perceived social support and PTSS.	
Nixon et al., 2012	Mental health centres, hospitals, police	34	Assault, home invasion, house fire, RTA, other	Children and adolescents who received trauma-focused treatment showed significant decreased levels of dysfunctional PTCs.	
Palosaari et al., 2013	School	240	Psychological maltreatment, war trauma	Dysfunctional PTCs decreased from 3 months to 5 months but stayed about the same from 5 months to 11 months.	No mediation on the association between acute and chronic PTSS (without treatment); levels of and changes in dysfunctional PTCs at baseline significantly predicted later levels and changes in PTSS but not vice versa.
Palosaari et al., 2016	School	240	Psychological maltreatment, war trauma	Parental PTSS did not predict child dysfunctional PTCs.	Levels of and changes in dysfunctional PTCs at baseline significantly predicted later levels and changes in PTSS but not vice versa.
				Dysfunctional PTCs mediated the effects of psychological maltreatment, war trauma, sibling conflict, and peer unpopularity on PTSS.	

Pfeiffer, Sachser, de Haan, et al., 2017	Clinical	123	Accidental, interpersonal	Treatment studies reported that a decrease in PTSS level from pre-to post-intervention was mediated by changes in dysfunctional PTCs in children and adolescents.	
Pfeiffer et al., 2018	Clinical, refugees	99	Accidental, interpersonal	Significantly fewer dysfunctional PTCs at the end of the intervention, but not significantly different from control group.	
Punamäki et al., 2015	School	240	Psychological maltreatment, war trauma		Low levels of, dysfunctional PTCs characteristic of children in the Resistant PTSS-related trajectory as compared to Increasing symptoms PTSS-related trajectory.
Salmon et al., 2007	Emergency department	66	Traumatic injury		Children's dysfunctional PTCs predicted acute stress reactions in children.
Salmond et al., 2011	Emergency department	50	Assault, RTA		Dysfunctional PTCs predicted acute symptom severity.
Smith et al., 2007	Clinical, Emergency department	24	Interpersonal violence, RTA, witnessing violence	Effects of cognitive-behavioural therapy were partially mediated by changes in dysfunctional PTCs.	

B Own Empirical Studies

This chapter describes the empirical studies included in this thesis. The aims, general procedure, and all four studies are discussed.

1 Aims

Resulting from the research gaps described above, the four studies presented in this thesis had two aims: (1) to investigate trauma and individual, and social characteristics as predictors of dysfunctional PTCs, and (2) to better understand the cross-sectional and longitudinal relationship between dysfunctional PTCs and psychological symptoms.

1.1 Predictors of Dysfunctional Posttraumatic Cognitions

Two studies in this thesis focused on possible predictors of dysfunctional PTCs:

a) Are sex, age, the interaction between sex and age, out-of-home-care, migration background, and multi-type maltreatment predictors for dysfunctional PTCs in a sample of maltreated children and adolescents? (Study 1)
b) Do characteristics of the trauma (trauma type), of the child (age at assessment, child sex, trauma load), and of the social environment (marital status, parental level of education, parental dysfunctional PTCs, parental PTSS) predict dysfunctional PTCs in children and adolescents exposed to accidental or interpersonal TEs? (Study 2)

1.2 Cross-Sectional and Longitudinal Associations with Psychological Symptoms

All four studies investigated the relations between dysfunctional PTCs and psychological symptoms. The following research questions were addressed:

a) Are dysfunctional PTCs significantly associated with PTSS, internalizing, and externalizing problems in a sample of children and adolescents with a history of maltreatment? (Study 1)
b) Do dysfunctional PTCs serve as a mediator between child and social characteristics and PTSS and depression in children exposed to interpersonal or accidental TEs? (Study 2)

c) What are central or bridge symptoms in a network model of dysfunctional PTCs, PTSS, and depression symptoms in an international sample of children and adolescents exposed to various TEs? (Study 3)
d) How do dysfunctional PTCs, PTSS, internalizing, and externalizing problems impact each other longitudinally in a sample of children and adolescents with a history of maltreatment? (Study 4)

2 General Methods

The following section briefly describes the general procedures, samples, measures, and analyses applied in each study.

2.1 Procedures

The studies included in this thesis were drawn from four research projects. Study1 and 4 used data from a longitudinal German multi-site study called CANMANAGE (CAN = **C**hild **A**buse and **N**eglect, and MANAGE = Case **Manage**ment; DRKS00003979; principal investigator (PI) Prof. Dr. Lutz Goldbeck). The research collaboratively addressed the implementation of managed mental healthcare for children and adolescents who had experienced abuse or neglect. The study was approved by the Institutional Review Board at the University of Ulm. Four clinics for child and adolescent psychiatry/psychotherapy in the German federal states of Baden-Wuerttemberg, North Rhine-Westphalia, and Lower Saxony served as recruiting sites in close collaboration with local child welfare institutions, non-government organizations, and clinics that referred eligible children and adolescents to the centres. Study 1 only used data from the first assessment. Study 4 used data from the first assessment, the second assessment 6 months after the first assessment, and the third assessment between 12 and 18 months after the first assessment. The maltreatment history was assessed with a joint interview of child and caregiver. In some cases, children or caregivers asked for separate interviews. Separate interviews were also suggested if the child showed discomfort answering questions in front of the caregiver or did not talk at all. Information regarding dysfunctional PTCs and psychological symptoms was gathered with paper-and-pencil questionnaires (see 2.3). Assessments took place at the University Hospital in Ulm.

Study 2 combined two international data sets: A Swiss longitudinal observational study entitled *Dysfunctional posttraumatic cognitions in children and adolescents* (PTC study; NCT02693249; PI Prof. Dr. Markus A. Landolt) investigates the naturalistic course of child and parental dysfunctional PTCs, psychological symptoms, and parenting behaviour in children and adolescents exposed to acute RTAs or burn injuries who received medical care at the University Children's Hospital Zurich. Three assessments were conducted: within the first 2 weeks, 3 months, and 6 months after the accident. The assessments took place either at the child`s home or at the University Children's Hospital Zurich. Interviews were conducted with the child; the parents filled in paper-and-pencil questionnaires. Child and parental data from the second assessment, three months after the accident, was included in Study 2. The German *TreatChildTrauma* study (TCT; NCT01516827; PI Prof. Dr. Lutz Goldbeck) investigated the effectiveness of trauma-focused cognitive behavioural therapy (Tf-CBT; Cohen, Mannarino, & Deblinger, 2009) for children and adolescents in Germany. Assessments took place before and after treatment. The data used in Study 2 was collected pre-treatment. Assessments took place at the University Hospital in Ulm. The trauma history was assessed in interview form, and dysfunctional PTCs and psychological symptoms were assessed via paper-and-pencil questionnaires. A subsample was included in Study 2; this included only participants that had experienced interpersonal trauma such as sexual abuse, sexual assault, physical violence, or witnessing domestic violence.

Study 3 used the *CPTCI International Data Set* (PI Anke de Haan). The CPTCI International Data Set is a worldwide collaboration of research groups investigating the role of PTCs in children and adolescents. A total of 17 data sets are included from 8 different countries with 2313 children and adolescents. Data was obtained by interview, pen-and-paper questionnaires, telephone, and online. Data from the second assessment of the Swiss PTC study described above is part of the CPTCI International Data Set.

2.2 Samples

In order to answer the research aims comprehensively, a variety of international samples were used for this thesis. To be able to compare findings, the same inclusion criteria were established for each sample: participants were school-aged, had experienced either a TE (that met the trauma A-criterion) or maltreatment; psychological symptoms were assessed via self-reports; and the CPTCI (Meiser-Stedman, Smith, et al., 2009) was administered.

Study 1 included 231 children and adolescents (8-17 years) and Study 4 included 263, all from the German CANMANAGE study. All of them had experienced maltreatment in the form of domestic violence, emotional abuse, neglect, physical, and/or sexual abuse.

Study 2 included two samples of children and adolescents exposed to trauma: 114 children and adolescents aged 7 to 16 who had experienced a RTA or burn injury from the Swiss PTC study and 113 children and adolescents aged 6 to 17 years who had experienced an interpersonal TE, such as sexual abuse, sexual assault, physical violence, or witnessing domestic violence from the German TCT study.

The sample used in Study 3 originated from the CPTCI International Data Set. The 2313 participants were aged between 6 and 18 years and had been exposed to accidental, interpersonal, or war TEs or natural disasters.

2.3 Measures

Self-report measures were included in all four studies. Child data was the main type used. Since many different questionnaires and versions to assess PTSS and depression symptoms were included in the CPTCI International Data Set (Study 3), only measures that were used in the CANMANAGE, TCT, or PTC studies will be reported (see Table 14, pp. 90-91 for specific information on the other PTSS and depression measures used in the CPTCI International Data Set).

Trauma or maltreatment history. In Studies 1 and 4, maltreatment experiences were assessed using the German version of the *Juvenile Victimization Questionnaire* (JVQ; Hamby, Finkelhor, Ormrod, & Turner, 2004), a structured interview adapted to lifetime history instead of the past year. The JVQ addresses three main areas: child maltreatment (covering physical abuse, emotional abuse, and neglect by a caregiver), sexual victimization, and witnessing domestic violence. Trauma history in the PTC study (Studies 2 and 3) was assessed with the German DSM-5 version of the UCLA PTSD-RI (Landolt, 2014; Steinberg et al., 2013) in the Swiss accidental trauma sample. The DSM-IV *Clinician-Administered PTSD Scale for Children and Adolescents* (Füchsel & Steil, 2006; Nader et al., 1996) was used in Study 2 for the TCT subsample. If more than one TE or maltreatment event was reported, the child was asked to identify the “worst” or most upsetting event. This event was referred to when assessing dysfunctional PTCs and PTSS.

Dysfunctional PTCs. The main measure in every study was the CPTCI (Meiser-Stedman, Smith, et al., 2009). As mentioned above, it contains 25 items and is divided into two subscales: permanent and disturbing change, and fragile person in a scary world. Items are rated on a 4-point scale from 1 (*don't agree at all*) to 4 (*agree a lot*). This measure has been translated and validated in several languages and is freely accessible (http://www.childrenandwar.org/measures/cptci/). Clinically relevant cut-offs for the original version and a short version (CPTCI-S) consisting of 10 of the 25 items were also reported (McKinnon et al., 2016). Studies 1 and 4 of this thesis included children and adolescents exposed to maltreatment. In both publications, the dysfunctional PTCs assessed with the CPTCI were called dysfunctional maltreatment-related cognitions in the manuscripts. In order to make clear that the same measures and cognitions were assessed in all four studies, and to be more reader friendly, the term *dysfunctional PTCs* is used for every study included in this thesis.

PTSS. The German version of the UCLA PTSD-RI DSM-IV and DSM-5 version was administered in all studies (Landolt, 2014; Steinberg et al., 2004; Steinberg et al., 2013). The items are rated on a 5-point scale from 0 (*none of the time*) to 4 (*most of the time*).

Depression. In the PTCs study (Study 2 and 3), the third German edition of the *Children's Depression Inventory* (CDI; Kovacs, 1985; Stiensmeier-Pelster, Braune-Krickau, Schürmann, & Duda, 2014) was applied to assess the presence and severity of depression symptoms. The participant can choose between three answer options per item. The second German edition (Stiensmeier-Pelster, Schürmann, & Duda, 2000) was used in the TCT subsample (Study 2).

Internalizing and externalizing problems. Studies 1 and 4 administered internalizing and externalizing problems with the *Strengths and Difficulties Questionnaire* (SDQ; R. Goodman, 1997). Although the self-report version was developed for children aged 11 to 17, it was used for the whole sample including children aged 8-10. Mellor (2004) has shown that the self-report is applicable to this younger age group as well. This 25-item questionnaire uses 3-point response scales with 0 (*not true*), 1 (*somewhat true*), and 2 (*certainly true*) and has five subscales of five items each: prosocial behaviour, conduct problems, peer relationship problems, emotional problems, and hyperactivity/inattention. In line with A. Goodman, Lamping, and Ploubidis (2010), the subscales for peer relationship problems and emotional problems were subsumed into the subscore for internalizing problems, and the subscales for conduct problems and hyperactivity/inattention were subsumed into the subscore for externalizing problems. The fifth subscale, prosocial behaviour, was not used in our analyses.

Parental data. Study 2 was the only study to include parental information: The PTCI (Foa et al., 1999) was administered to the caregiver to rate his or her own dysfunctional PTCs related to the child's TE, similar to Nixon et al.'s (2012) study. Parental PTSS were assessed with either the DSM-IV or DSM-5 German version of the *Posttraumatic Diagnostic Scale* (Ehlers, Steil, Winter, & Foa, 1996; Burgmer, Ehlers, Foa, & Wittmann, 2016 translated from Foa et al., 2016).

2.4 Statistical Analyses

Statistical analyses were conducted using Mplus (Muthén & Muthén, 1998-2017), R (R-Core-Team., 2017), and the *Statistical Package for Social Sciences* (SPSS, IBM-Corp., 2013). Studies 1, 2, and 3 used cross-sectional data; Study 4 included data from three assessments. In addition to calculations regarding sample descriptions and mean differences, state-of-the-art analyses were conducted: Study 1 used multivariate regression analyses including dummy-coded, effect-coded, and interaction variables as predictors for dysfunctional PTCs. Structural equation modelling (SEM) was applied in Study 2 to investigate paths, mediation effects, and compare findings between both samples. A network analysis was calculated in Study 3 focusing on the relation of dysfunctional PTCs, PTSS, and depression symptoms at item level. Central items and relations between constructs were investigated. Study 4 calculated cross-lagged panel analyses using three time-points and taking into account covariates.

3 Studies Presented in this Thesis

The following studies have either been published (Study 1), submitted to peer-reviewed journals (Studies 2 and 4) or are in final preparation for submission (Study 3). Chapter 3.1 includes the published version of Study 1 and the current versions of the other studies.

3.1 Dysfunctional Maltreatment-Related Cognitions in Children and Adolescents

de Haan, A., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (2017). Dysfunctional maltreatment-related cognitions in children and adolescents. *Child and Adolescent Psychiatry and Mental Health, 11*, 31.

Abstract

Background: Dysfunctional trauma-related cognitions correlate highly with chronic stress. Studies on maltreatment-related cognitions and their predictors in children and adolescents are rare.

Methods: The study sample consisted of 231 children aged 8-17 who had experienced maltreatment including domestic violence, emotional abuse, neglect, physical, and sexual abuse. Using multiple linear regression analysis, gender, age, index-event, multi-type maltreatment, out-of-home-care, and migration background were investigated as possible predictors of dysfunctional maltreatment-related cognitions. Additionally, the associations between dysfunctional cognitions and posttraumatic stress symptoms (PTSS) as well as further internalizing and externalizing symptoms were calculated.

Results: Gender emerged as a significant predictor of dysfunctional maltreatment-related cognitions. Moreover, there was an interaction effect of gender and age, with female adolescents showing most dysfunctional cognitions. Furthermore, experiencing five different maltreatment types had an impact, leading to more dysfunctional cognitions compared to single-type maltreatment. Dysfunctional maltreatment-related cognitions correlated highly with PTSS and internalizing symptoms, and moderately with externalizing symptoms.

Conclusions: Dysfunctional maltreatment-related cognitions are associated with psychological symptoms after maltreatment and, therefore, need to be addressed in assessment and treatment.

Keywords: dysfunctional cognitions, maltreatment, multiple linear regression analysis, psychopathology

Child maltreatment is associated with an increased risk of long-persisting mental and physical problems (Buckingham & Daniolos, 2013; Fergusson, Boden, & Horwood, 2008; Sachs-Ericsson, Kendall-Tackett, & Hernandez, 2007; Springer, Sheridan, Kuo, & Carnes, 2007) including cognitive aspects such as negative self-associations (Alloy, Abramson, Smith, Gibb, & Neeren, 2006; van Harmelen et al., 2010). Caregivers and other important persons are often involved in maltreatment which can have a dramatic impact on a child's view of himself, his family, and the world.

Cognitive models from trauma research might be helpful in understanding the impact of cognitions on maltreatment recovery. One recognized trauma model is Ehlers and Clark's cognitive model of posttraumatic stress disorder (Ehlers & Clark, 2000). It suggests that appraising the traumatic event and its consequences as extremely negative leads to a feeling of current threat with external-related thoughts such as "the world is a scary place where I am highly vulnerable" and internal-related thoughts such as "I am an incompetent person, I will never be the same again". This perception of current threat is accompanied by intrusions and symptoms of arousal, anxiety, and other emotional responses. Moreover, it also motivates behavioral and cognitive responses which are intended to reduce perceived threat and distress for a short period of time. However, they have the long-term consequence of preventing cognitive change and, therefore, of maintaining the disorder (Ehlers & Clark, 2000). Permanent and extremely negative appraisals about oneself and the world is conceptualized in the posttraumatic stress disorder (PTSD) symptom cluster *negative alterations in cognitions and mood* within the latest edition of *the Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; APA, 2013).

In line with Ehlers and Clark`s model, a lot of research has been done focusing on the extremely negative appraising of the trauma and its consequences. These trauma-related cognitions, also called dysfunctional posttraumatic cognitions, were investigated in heterogeneous international trauma studies showing significant correlations between dysfunctional posttraumatic cognitions and acute stress disorder (Salmon et al., 2007; Salmond et al., 2011), PTSD (Bryant et al., 2007; de Haan et al., 2016; Meiser-Stedman, Dalgleish, et al., 2009), symptoms of depression and anxiety (Liu & Chen, 2015; Meiser-Stedman, Smith, et al., 2009) as well as externalizing symptoms (Liu & Chen, 2015). Much of the above mentioned research was conducted in samples of children and adolescents with single or accidental traumatic experiences. Studies involving children and adolescents who have been exposed to chronic stress exposure, e.g. maltreatment are rare. Leeson and Nixon (2011) had a small sample of children who had experienced maltreatment (n = 24) and a control group (n = 26).

They found that children`s dysfunctional cognitions about permanent change and a scary world were associated with self-reported depression, self-esteem, and posttraumatic stress symptoms (PTSS). These findings are in line with other studies which found that maltreatment-related cognitions such as threat appraisal or self-blame were associated with internalizing and externalizing problems (e.g. Fosco & Grych, 2008; Jouriles, Spiller, Stephens, McDonald, & Swank, 2000). However, more studies about maltreatment-related cognitions focusing on the constructs fragile person and scary world derived from Ehlers and Clark`s model (2000) are missing.

Furthermore, the cognitions' impact on posttraumatic psychopathology is widely acknowledged, but studies on predictors of dysfunctional cognitions are rare. Investigating possible predictors might help to identify children and adolescents more vulnerable to develop and maintain dysfunctional maltreatment-related cognitions. Ehlers and Clark`s model (2000) was developed for adults, but the model is applicable for children and adolescents (Ehlers et al., 2003; Stallard, 2003). However, developmental factors should be considered, such as the child's developmental stage including abstract cognitive abilities, the role of the family etc. (Meiser-Stedman, 2002).

Just a few studies have investigated predictors up to now: Significant gender differences were found, with girls having significantly more dysfunctional posttraumatic cognitions; but no age effect has been detected so far (Diehle et al., 2015; Meiser-Stedman, Smith, et al., 2009). Additionally, the effect of the trauma type experienced were investigated. Liu and Chen's study (2015) found that children and adolescents, who had experienced a traffic accident, showed most dysfunctional posttraumatic cognitions followed by participants reporting a personal trauma, medical trauma, or natural disaster. In contrast, Meiser-Stedman, Smith, et al. (2009) reported that children, who had experienced an assault, had significantly more dysfunctional posttraumatic cognitions than those who had experienced an accident. Palosaari et al. (2016) found that war trauma, parental psychological maltreatment, sibling conflict, and loneliness among peers predicted dysfunctional posttraumatic cognitions in war-affected children aged 10 to 12 years old.

Further impact factors can be traced from maltreatment research in children and adolescents: Since several studies showed that experiencing multi-type maltreatment had a significant impact on symptom severity (Arata et al., 2005; Salazar et al., 2011), experiencing multi-type maltreatment might also lead to more dysfunctional maltreatment-related cognitions. Moreover, out-of-home-care might impact the amount of dysfunctional maltreatment-related cognitions as well. Kolko et al. (2010) described that the prevalence of clinically significant

PTSS was higher for children who were placed in out-of-home care than those maintained at home. So, there might be similar results regarding dysfunctional cognitions. Furthermore, coming from a migration background might also have an impact. Migration itself can be a very stressful (Bhugra, 2004), moreover, Schick et al. (2016) found that a migration background was a risk factor of child maltreatment. Additionally, the prevalence in mental disorders differed between migrants and non-migrant in a study by Gaber et al. (2013). It might be possible that there is also a migration-specific effect on dysfunctional maltreatment-related cognitions. Additionally, variables such as socio economic status, perpetrator, and age at onset might impact developing and maintaining dysfunctional maltreatment-related cognitions. However, due to a third of children in out-home-care and mainly multi-type maltreatment in our study sample we were not able to investigate these variables.

In the current paper, we included variables which have been investigated within dysfunctional posttraumatic cognitions studies such as age, gender, and index-event. Since research on depression regarding cognitive vulnerability showed significantly different cognitive style trajectories in males and females aged between 11 and 15 leading to significantly greater cognitive vulnerability in female adolescents (Mezulis et al., 2010), we also investigated the interaction effect of age and gender on maltreatment-related cognitions. Unfortunately, children with a maltreatment background often experience more than one event and/or more than one type of maltreatment, e.g. physical and sexual abuse (Salazar et al., 2011). Therefore, irrespectively of multi-type maltreatment we asked the children to subjectively rate their most stressful event. Additionally, we chose variables from maltreatment research such as multi-type maltreatment, out-of-home-care, and migration background.

Furthermore, we were interested in the association between cognitions and psychopathology. As mentioned above, a lot of studies in traumatized samples showed significant associations between dysfunctional cognitions and psychopathology. However, dysfunctional cognitions correlated strongly with internalizing symptoms but only to a limited degree with externalizing symptoms suggesting that they are both of interest but should be investigated separately.

Summing up, in this study we sought to fill the current gaps in the literature on maltreatment-related cognitions in investigating the following two research questions:

First, we wanted to explore possible predictors for dysfunctional maltreatment-related cognitions. We considered gender (female > male), age at assessment (adolescents > children), interaction of gender and age, out-of-home-care (yes > no), migration background (yes > no), and multi-type maltreatment (multi-type > single-type maltreatment).

Secondly, we investigated associations of dysfunctional maltreatment-related cognitions with a range of self-reported internalizing and externalizing symptoms, and especially with self-reported PTSS. We hypothesized strong positive correlations between cognitions, PTSS, and further internalizing symptoms, as well as moderately correlations between cognitions and externalizing symptoms.

Methods

Procedure

We included children and adolescents with a known history of exposure to maltreatment reported by the responsible child welfare agency. All participated voluntarily in the German multi-site study *CANMANAGE,* which is a research collaborative addressing the implementation of managed mental healthcare for children and adolescents who have experienced abuse or neglect (DRKS00003979). The study was approved by the Institutional Review Boards at the different recruiting study sites. Four clinics for child and adolescent psychiatry/psychotherapy in the German federal states of Baden-Wurttemberg, North Rhine-Westphalia, and Lower Saxony served as recruiting study sites in close collaboration with child welfare institutions that referred eligible children and adolescents to the centers. Inclusion criteria were age between 4-17, caregivers' willingness to participate, experience of child abuse and/or neglect as well as informed consent of all legal guardians. Taken all study sites together, 478 children and adolescents were invited for study participation, 65 were not interested in participating in a study in general, 38 declined to cooperate after they had been informed specifically about the CANMANAGE study. In total 375 participants aged from 4-17 who had experienced maltreatment including domestic violence, emotional abuse, neglect, physical, and/or sexual abuse participated in the CANMANAGE project. For the current paper, 107 participants who were younger than 8 years old were not included. Due to the study design, they had not completed the self-report measures we used in our analyses. Out of these 268 eligible participants, 37 participants were excluded because of missing data in relevant variables such as dysfunctional maltreatment-related cognitions, PTSS etc. (> 25 % missing data per questionnaire). This led to a sample size of 231 participants, from which 157 had been referred by child welfare institutions and 74 were recruited from clinical settings or came on their own initiative.

Measures

Maltreatment. Maltreatment experiences were assessed using the German version of the structured interview *Juvenile Victimization Questionnaire* (JVQ; Hamby et al., 2004) showing good psychometric properties (Cronbach's α = .80; κ = .59; Finkelhor, Hamby, Ormrod, & Turner, 2005). Each child was accompanied either by his parents (*n* = 148, 64.1%) or in one third by foster care workers or sometimes by other relatives such as grandparents (*n* = 83, 35.9%). The participating caregivers were non-offending or no longer offending. Due to the research collaborative study design, child and attendant were interviewed together. It was beneficial to have caregiver and child do the interview together, because both reports could be easily combined. However, it is possible that children, out of consideration for their parents, aligned their reports to their parents` reports. Nevertheless, in one third of the cases the children were accompanied by foster care workers or other relatives. Furthermore, most children had been referred by child welfare institutions, therefore, their maltreatment history had been known beforehand. Additionally, separate interviews were possible if either the child or caregiver showed discomfort with the situation. If more than one episode within the JVQ was affirmed, study participants identified the "worst" or most upsetting event. We assumed that the most upsetting event might be the most impacting and relevant event at the moment. Therefore, this event was called "index-event" and referred to when assessing PTSS and dysfunctional maltreatment-related cognitions. Standardized clinical evaluation was performed by trained assessors supervised by study coordinators and the principal investigator.

Maltreatment-related cognitions. The German version of the *Child Posttraumatic Cognitions Inventory* (CPTCI; Meiser-Stedman, Smith, et al., 2009) is a self-report measure for children and adolescents assessing dysfunctional trauma-related cognitions, derived from Ehlers and Clark's model (2000). The two subscales consist of 13 items for the subscale *permanent and disturbing change* (CPTCI-PC) and 12 items for the subscale *fragile person in a scary world* (CPTCI-SW), which are rated on a 4-point scale with 1 (*don't agree at all*), 2 (*don't agree a bit*), 3 (*agree a bit*), and 4 (*agree a lot*). The scores range from 25 to 100 for the total scale, from 13 to 52 for subscale CPTCI-PC, and from 12 to 48 for subscale CPTCI-SW. Examples for items are "My reactions since the frightening event mean I have changed for the worse" (CPTCI-PC item) or "I can't stop bad things from happening to me" (CPTCI-SW item). The German version showed good psychometric properties in both total scale (*Cronbach*'s α = .94) and subscales (*Cronbach*'s α = .91 and .86; de Haan et al., 2016). Since the subscales were highly correlated with the total score (Spearman's correlations = .94 and .93, $p < .001$) as well

as highly intercorrelated (Spearman's correlations = .76, $p < .001$) in our current sample, only the total score was used (*Cronbach*'s α = .92).

Posttraumatic stress symptoms. The German version of the *University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index* (UCLA PTSD-RI; Steinberg et al., 2004) is a self-report measure of PTSS according to DSM-IV for school-age children and adolescents with good psychometric properties (e.g. *Cronbach*'s α = .88–.91; Steinberg et al., 2013; current study *Cronbach*'s α = .83). For the total score 17 items were included, rated on a 5-point scale from 0 (*none of the time*) to 4 (*most of the time*).

Internalizing and externalizing symptoms. Internalizing and externalizing symptoms were assessed using the self-report of the German version of the *Strengths and Difficulties Questionnaire* (SDQ; R. Goodman, 1997). This 25-item questionnaire rated on a 3-point scale with 0 (*not true*), 1 (*somewhat true*), and 2 (*certainly true*) showed adequate psychometric properties (*Cronbach*'s α mean = .73; R. Goodman, 2001). Although the self-report version was developed for children aged 11 to 17 years old, we used it for our whole sample including children aged 8-10 years. Mellor (2004) showed that the self-report is applicable for this younger age group. The measure has five subscales consisting of five items each: prosocial behavior, conduct problems, peer relationship problems, emotional problems, and hyperactivity/inattention. We did not include the prosocial subscale, but used the other four subscales (= 20 items) to create a total difficulties score (*Cronbach*'s α = .77). On a sub-score level (A. Goodman et al., 2010), the subscales peer relationship problems and emotional problems were subsumed to the sub-score internalizing problems (*Cronbach*'s α = .72); the subscales conduct problems and hyperactivity/inattention to the sub-score externalizing problems (*Cronbach*'s α = .67).

Data Analyses

Statistical analyses were performed using the *Statistical Package for Social Sciences* (SPSS, version 21.0). Statistical significance was established at an alpha level of .05.

First, descriptive analysis regarding sample description and dysfunctional maltreatment-related cognitions were calculated. To get a first impression how relevant the items were, we checked how many participants rated each item with 3 (*agree a bit*) and 4 (*agree a lot*). Secondly, a multiple linear regression analysis was calculated for investigating gender, age, interaction of gender and age, index-event, multi-type maltreatment, out-of-home-care, and migration background as possible predictors. All predictors were categorical variables; therefore, effect coding was applied to them. Effect coding compares how the effect differs

from the grand mean (Eid, Gollwitzer, & Schmitt, 2011). Dummy coding was applied to the variable multi-type maltreatment with subgroup single-type maltreatment used as the reference variable to compare with the other options of multi-type maltreatment ranging from two to five maltreatment types. Experiencing five types meant, for example, that these participants had experienced domestic violence, emotional abuse, neglect, physical abuse, and sexual abuse. When calculating the multiple linear regression analysis, we included all variables in one step simultaneously. Finally, Spearman's correlations were conducted to investigate the association between cognitions, PTSS, further internalizing, and externalizing symptoms. Because of these multiple tests the *p*-values were *Sidak*-adjusted in order to prevent misleading results due to alpha error inflation.

Results

Descriptive Analyses

First of all, the description of our sample is given in Table 4.

Table 4

Sociodemographic data and maltreatment-related information

Variable	Subgroup	Total sample	$N = 231$
		n	%
Gender	Male	133	57.6
	Female	98	42.4
Age	Children (8-12)	149	64.5
($M = 12.0$, $SD = 2.5$)	Adolescents (13-17)	82	35.5
School	Elementary school	63	27.3
	Middle and High school	106	45.9
	School for children with learning difficulties	46	19.9
	Not determined[a]	16	6.9
Household incomes per month	Under 500 €	7	3.0
	500 € – under 1000 €	26	11.3
	1000 € – under 2000 €	65	28.1
	2000 € – under 3000 €	40	17.3
	3000 € – under 4000 €	25	10.8
	4000 € – under 5000 €	20	8.7
	5000 € and more	11	4.8
	Not determined[a]	37	16.0

Occupation mother	Not employed (e.g. pensioner, student etc.)	65	28.1
	Unemployed, seeking work	35	15.2
	Temporary leave of absence e.g. parental leave	8	3.5
	Part-time job or employed on hourly basis	68	29.4
	Full-time job	34	14.7
	Apprentice	1	0.4
	Not determined[a]	20	8.7
Occupation father	Not employed (e.g. pensioner, student etc.)	29	12.6
	Unemployed, seeking work	22	9.5
	Temporary leave of absence e.g. parental leave	0	0.0
	Part-time job or employed on hourly basis	16	6.9
	Full-time job	112	48.5
	Apprentice	3	1.3
	Not determined[a]	49	21.2
Index-Event	Domestic violence	57	24.7
	Emotional abuse	23	10.0
	Neglect	30	13.0
	Physical abuse	65	28.1
	Sexual abuse	56	24.2
Maltreatment type (*Note.* Take multi-type maltreatment in account)	Domestic violence	158	68.4
	Emotional abuse	124	53.7
	Neglect	131	56.7
	Physical abuse	175	75.8
	Sexual abuse	89	38.5
Co-occurrence of maltreatment types	Single-type maltreatment	32	13.9
	Two types	58	25.1
	Three types	59	25.5
	Four types	58	25.1
	Five types	24	10.4
Out-of-home-care	Yes	78	33.8
	No	153	66.2
Migration background[b]	Yes	75	32.5
	No	128	55.4
	Not determined[a]	28	12.1

Note. [a] "Not determined" means that these participants could not be reliably classified in any category due to insufficient information. [b] Migration background was defined as non-German nationality or non-German place of birth of the child or at least of one parent.

Table 5 shows the five dysfunctional maltreatment-related cognitions the participants agreed the most with. It included thoughts such as “I can’t stop bad things from happening to me”, “Anyone could hurt me”, or “I’m scared that I’ll get so angry that I’ll break something or hurt someone”.

Table 5

Top 5 dysfunctional maltreatment-related cognitions

Item	Agree a bit/ Agree a lot	Subscale
I can’t stop bad things from happening to me	50.2 %	CPTCI-SW
Anyone could hurt me	41.1 %	CPTCI-SW
I’m scared that I’ll get so angry that I’ll break something or hurt someone	36.8 %	CPTCI-PC
I can’t cope when things get tough	35.9 %	CPTCI-SW
I have to watch out for danger all the time	32.0 %	CPTCI-SW

Note. CPTCI-PC = Subscale Child Post-Traumatic Cognitions Inventory permanent and disturbing change; CPTCI-SW = Subscale Child Post-Traumatic Cognitions Inventory fragile person in a scary world. $N = 231$.

Possible Predictors

Table 6 shows means, standard deviations, minima and maxima of dysfunctional maltreatment-related cognitions.

Table 6

Means, standard deviations, and ranges of dysfunctional maltreatment-related cognitions

Variable	*n*		CPTCI total score range (25–100)			
			M	*SD*	Min	Max
Gender	133	Male	42.84	13.12	25	86
	98	Female	48.32	15.40	25	95
Age (at assessment)	149	Children (8-12)	44.05	13.00	25	86
	82	Adolescents (13-17)	47.20	16.44	25	95
Male	91	Children (8-12)	44.09	13.47	25	86
	42	Adolescents (13-17)	40.14	12.04	25	75
Female	58	Children (8-12)	43.98	13.33	25	76
	40	Adolescents (13-17)	54.60	17.30	25	95

Index-Event	57	Domestic violence	43.51	12.98	25	78
	23	Emotional abuse	43.96	16.15	25	84
	30	Neglect	45.20	14.07	26	86
	65	Physical abuse	43.68	12.64	25	86
	56	Sexual abuse	49.05	16.56	25	95
Co-occurrence of maltreatment types	32	Single-type maltreatment	43.25	16.41	25	90
	58	Two types	44.16	13.14	25	84
	59	Three types	42.95	13.19	25	86
	58	Four types	45.72	12.28	25	76
	24	Five types	54.25	18.74	28	95
Out-of-home-care	78	Yes	43.78	12.19	25	86
	153	No	45.87	15.33	25	95
Migration background [a] *N* = 203	75	Yes	44.23	13.21	25	90
	128	No	44.63	14.79	25	95

Note. CPTCI = Child Post-Traumatic Cognitions Inventory. Sample size $N = 231$, except migration background.

[a] Migration background was defined as non-German nationality or non-German place of birth of the child or at least of one parent.

Gender, the interaction of gender and age as well as experiencing all kind of maltreatment types (co-occurrence of all five maltreatment types) had a significant impact on dysfunctional maltreatment-related cognitions (see Table 7). The overall model explained 20% of the variance in dysfunctional maltreatment-related cognitions ($F(13) = 3.63$, $p < .001$).

Table 7

Predictors of dysfunctional maltreatment-related cognitions

	Unstandardized coefficients		Standardized coefficients		
	B	*SE B*	β	*t*	*p*
Constant	40.80	2.76		14.81	.000
Gender	3.48	1.02	.24	3.40	.001
Age (at assessment)	1.62	1.02	.11	1.58	.115
Gender x Age	4.46	1.01	.31	4.40	.000
Index-Event					
Domestic violence	0.71	1.80	.03	0.39	.695
Neglect	0.63	2.29	.02	0.28	.782
Physical abuse	-0.78	1.72	-.03	-0.45	.652
Sexual abuse	1.58	1.91	.06	0.83	.410
Co-occurence[a]					
Two types	3.16	3.26	.10	.97	.334
Three types	1.44	3.29	.04	.44	.662
Four types	2.53	3.21	.08	.79	.433
Five types	11.19	3.95	.24	2.84	.005
Out-of-home-care	-1.68	1.06	-.11	-1.58	.116
Migration background[b]	-0.35	0.99	-.02	-.35	.725
Model summary	$F(13) = 3.63$, $p < .001$, $R = .447$, $R^2 = .200$, R^2 adj. = .145				

Note. SE = Standard Error. [a] Subgroup single-type maltreatment was used as the reference variable for testing the impact of co-occurrence of maltreatment types. [b] Migration background was defined as non-German nationality or non-German place of birth of the child or at least of one parent. Sample size $N = 203$.

Association with Psychological Symptoms

Dysfunctional maltreatment-related cognitions correlated strongly ($r > .50$) with PTSS, further internalizing symptoms as well as the total difficulties score. They were moderately associated ($r > .30$) with externalizing symptoms (see Table 8). The correlations between cognitions and PTSS were significantly stronger than the correlation between cognitions and externalizing symptoms ($r = .72$ vs. $r = .43$, $Z = 5.65$, $p < .001$). Additionally, the association between cognitions and internalizing symptoms were significantly stronger than cognitions and externalizing symptoms ($r = .65$ vs. $r = .43$, $Z = 3.98$, $p < .001$).

Table 8

Spearman's correlations between dysfunctional maltreatment-related cognitions, posttraumatic stress symptoms, further internalizing, and externalizing symptoms

	UCLA PTSD-RI	SDQ internalizing problems	SDQ externalizing problems	SDQ total difficulties score
CPTCI total score	.72	.65	.43	.64

Note. CPTCI = Child Post-Traumatic Cognitions Inventory. UCLA PTSD-RI = University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index. SDQ = Strength and Difficulty Questionnaire. Sample size N = 231. p-values were Sidak-adjusted. They were all significant at a $p < .001$ level.

Discussion

The aim of our study was to gain better understanding of dysfunctional maltreatment-related cognitions in children and adolescents by investigating possible predictors of dysfunctional cognitions as well as their correlations with internalizing and externalizing symptoms. First of all, we found that dysfunctional cognitions regarding permanent and disturbing change and fragile person in a scary world derived from Ehlers and Clark`s model (2000) were relevant in children and adolescents with a chronic maltreatment background: For example, 50 % of our sample agreed with the thought "I can't stop bad things from happening to me" portraying a feeling of a fragile person in a scary world. Furthermore, on total scale level we found descriptively, that the means of dysfunctional maltreatment-related cognitions in the subgroups females, adolescents, female adolescents, index-event sexual abuse, and experiencing all five maltreatment types were within and above the clinically significant CPTCI cutoff range of 46 to 48. This cutoff range was found to be the best indicator of clinically significant appraisals determined by the presence of PTSD in a hospital-recruited sample of 535 participants aged 7-17 years (McKinnon et al., 2016). Although the differences in the sample background needs to be taken into account, it shows that we had dysfunctional maltreatment-related cognitions within a clinical relevant range in our sample.

Consistent with this descriptive observation mentioned above, gender as well as the interaction of gender and age were significant predictors for dysfunctional maltreatment-related cognitions. In line with previous studies (Diehle et al., 2015; Meiser-Stedman, Smith, et al., 2009), girls had significantly more dysfunctional maltreatment-related cognitions than boys; age did not have a significant effect. Building on these findings of previous studies, a significant

interaction effect of gender and age was detected, with female adolescents showing most dysfunctional cognitions. This is in line with Mezulis et al. (2010) who described that significantly different cognitive style trajectories in males and females aged between 11 and 15 led to significantly greater cognitive vulnerability in female adolescents. Two depression research models might help to understand these differences in adolescents better. Research findings who support the *exposure model* reported that a higher prevalence of depression in female adolescents (Hoffmann, Petermann, Glaeske, & Bachmann, 2012) can be explained by a higher cognitive vulnerability in females (Calvete & Cardeñoso, 2005; Hankin & Abramson, 2002). However, a second model, the *cognitive scar model* (Nolen-Hoeksema, Girgus, & Seligman, 1992), suggests that preceding higher depression scores in girls predict higher dysfunctional cognitions in female adolescents (Mezulis et al., 2010). Adapting these two models to dysfunctional maltreatment-related (or posttraumatic) cognitions and PTSD might help us to understand the association between age, gender, cognitions, PTSS, and depression better. Different ways are possible: a) The reason for a higher female PTSD prevalence after traumatic events (Alisic et al., 2014) might emerge due to higher levels of dysfunctional cognitions in females; b) Preceding higher PTSD scores in girls might predict higher dysfunctional cognitions in female adolescents; c) Preceding higher depression scores in girls might predict higher dysfunctional cognitions which eventually lead to higher PTSD scores in female adolescents. Longitudinal research on the transition from childhood to adolescence is needed. However, when investigating age and gender it might be important to take the trauma experience in account. Female participants often report more sexual abuse than male participants (Tolin & Foa, 2002). In our sample, female adolescents reported more sexual abuse (57.5%) than female children (46.6%), male adolescents (35.7%), or male children (26.4%). Regarding sexual abuse as index-event we found the following distributions: female adolescents 40%, female children 27.6%, male adolescents 26.2%, and male children 14.3%. However, we did not find that sexual abuse (as index-event) or any other maltreatment type was significantly associated with more dysfunctional cognitions compared to the other maltreatment types. This might be explained by the fact that even if their subjectively most stressful event differed, most of them had a similar history of multiple forms of maltreatment. Regarding multi-type maltreatment, we only found a significant impact of experiencing all five kind of maltreatment types (domestic violence, emotional abuse, neglect, physical abuse, and sexual abuse) on cognitions compared to single-type maltreatment. Experiencing two to four maltreatment types compared to single-type maltreatment did not predict significantly more dysfunctional cognitions. This is contrary to several studies showing that experiencing multi-

type maltreatment had a significant impact on symptom severity (Arata et al., 2005; Salazar et al., 2011). Dysfunctional cognitions and symptoms severity might, therefore, be seen independently in the context of multi-type maltreatment, even though they are generally highly correlated. Further studies are needed to understand the association between multi-type maltreatment, dysfunctional cognitions, and symptom severity. Furthermore, neither out-of-home-care nor migration background emerged as significant predictors for dysfunctional maltreatment-related cognitions. The latter is in line with studies about other variables such as health-related quality of life (Ravens-Sieberer, Erhart, Wille, & Bullinger, 2008) and internalizing disorders (Belhadj Kouider, Lorenz, Dupont, & Petermann, 2015) that did not find significant differences between migrants and non-migrants either. In our sample it also did not make a difference if participants were placed in out-of-home care or maintained at home. All in all, our regression model only accounted for 20 % variance and when adjusted to the amount of variables we were using only 14.5 %. Focusing solely on child-related cognitions seems not enough.

Regarding our second hypothesis the association between dysfunctional maltreatment-related cognitions and psychopathology our findings of strong correlations between dysfunctional maltreatment-related cognitions and self-reported PTSS as well as further internalizing symptoms are consistent with previous studies (de Haan et al., 2016; Leeson & Nixon, 2011; Meiser-Stedman, Smith, et al., 2009). In contrast, studies comparing dysfunctional cognitions with parent-reported internalizing problems found smaller correlations (Leeson & Nixon, 2011; Liu & Chen, 2015). Discrepancies between self-reports and proxy-reports are in line with the literature (Achenbach, McConaughy, & Howell, 1987). The assessment of internalizing problems preferably includes multiple informants (Comer & Kendall, 2004; Kassam-Adams, 2006; Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Scheeringa, Wright, Hunt, & Zeanah, 2006; Silverman & Ollendick, 2005), because parents might underestimate symptoms (Schreier, Ladakakos, Morabito, Chapman, & Knudson, 2005) or their reporting might be influenced by their own symptoms (Kassam-Adams, Garcia-Espana, Miller, & Winston, 2006). Despite the differences between self-reports and proxy-reports, the strong correlations between dysfunctional maltreatment-related cognitions and self-reported internalizing symptoms support Leeson and Nixon's statement (2011) that dysfunctional cognitions play a particularly important role in the development of internalizing symptoms in children who have experienced maltreatment, similar to adult studies (Gibb, Benas, Crossett, & Uhrlass, 2007; Valle & Silovsky, 2002; van Harmelen et al., 2010). However, the relationship between dysfunctional maltreatment-related cognitions, PTSS, and

internalizing symptoms could also be comparable to the results about cognitive vulnerability in depression which reported bidirectional changes over time among cognitions and internalizing symptoms (McCarty, Vander Stoep, & McCauley, 2007). Due to our cross-sectional design we were not able to investigate causal relationships between cognitions and psychopathology.

The moderate correlations between dysfunctional cognitions and externalizing symptoms in our study were slightly stronger than in studies which had assessed proxy-reported externalizing symptoms (Leeson & Nixon, 2011; Liu & Chen, 2015). Again, discrepancies between self-reports and proxy-reports might be one reason for the slightly different results. However, other studies showed that child maltreatment had the long-term effect of externalizing and antisocial behavior impacted by objective variables such as chronicity (Éthier, Lemelin, & Lacharité, 2004) as well as more subjectively biased variables such as alienation from the primary caregiver (Egeland, Yates, Appleyard, & van Dulmen, 2002). Dysfunctional maltreatment-related cognitions might therefore be a basis for later externalizing behaviour problems. One third in our sample agreed with the thought "I'm scared that I'll get so angry that I'll break something or hurt someone" which might give an idea about the relevance of externalizing problems. Further studies on trauma, maltreatment, dysfunctional cognitions, and externalizing symptoms are needed to gain a better understanding of their relationships. Additionally, gender-specific pattern should be taken into account: Cullerton-Sen et al. (2008), for example, reported that maltreatment was associated with physical aggression for male adolescents and relational aggression for female adolescents.

Limitations

Several limitations of this study need to be mentioned. Because of the cross-sectional design, we could not prove any causal relationship between variables. Nevertheless, we were able to add important information regarding dysfunctional cognitions and psychological symptoms from a cross-sectional angle. Moreover, we only used child self-reported data regarding dysfunctional cognitions and psychopathology which might have led to a biased information content. Further limitations emerge from our study sample because most participants reported multi-type maltreatment. Multi-type maltreatment is very common in children and adolescents with a maltreatment background. However, it made it difficult for us to assess the impact of distinct maltreatment-types or timing of abuse. Additionally, we were not able to control for variables such as socio economic status, perpetrator, and age at onset which might have an effect as well. They might be the reason for non-significant findings regarding maltreatment type or frequency. Maybe perpetrator and age at onset play a more

important role than the event itself or they interact with the event and frequency. Furthermore, our study focused solely on demographic variables, however, variables such as temperament or coping styles might play an important role, too.

Implications

The strong associations between dysfunctional maltreatment-related cognitions and psychological symptoms underline the clinical relevance of dysfunctional appraisals which should be included routinely in clinical assessment. With the CPTCI original and short form (McKinnon et al., 2016) two screening instruments are available for children and adolescents to assess and monitor dysfunctional cognitions systematically. Female adolescents, in particular, tend to develop dysfunctional maltreatment-related cognitions, and this need to be taken into account when planning interventions. Cognitive restructuring in the case of distorted maltreatment-related cognitions might, therefore, be a promising strategy to prevent chronic psychological problems following victimization, something that has already been demonstrated for cognitive treatments of maltreatment-related posttraumatic stress disorder (Cohen, Deblinger, Mannarino, & Steer, 2004).

Furthermore, dysfunctional maltreatment-related cognitions are associated not only with internalizing, but also externalizing symptoms. The relationship between dysfunctional cognitions and externalizing symptoms merits more attention in research and clinical practice. Otherwise, maltreated children with externalizing symptomatic might be treated only on the behavioral level and the underlying cognitive component might be missed.

Further research is needed on different topics. On one hand, more research is needed to understand gender differences for developing dysfunctional cognitions in the aftermath of maltreatment and/or trauma. Additionally, other possible predictors of dysfunctional posttraumatic or maltreatment-related cognitions should be investigated, e.g. parental-related variables or further child-related variables such as temperament, coping styles, and cognitive ability. Structural equation modeling combining predictors, dysfunctional cognitions, and child symptoms in a longitudinal design would be a further step. Furthermore, more longitudinal studies are necessary to investigate the pathways between cognitions and psychopathology. Especially research about dysfunctional cognitions and externalizing symptoms are of interest.

Conclusions

Dysfunctional maltreatment-related cognitions have been rarely investigated so far, therefore, we are able to add important knowledge to this topic with the findings from our large study sample. Both the descriptive analysis of the dysfunctional maltreatment-related cognitions and their strong associations with psychological symptoms underline that dysfunctional cognitions regarding permanent and disturbing change and fragile person in a scary world, derived from Ehlers and Clark`s recognized cognitive model (2000), seems to be relevant in children and adolescents with a chronic maltreatment background. Due to the cognitions` association with psychopathology, dysfunctional maltreatment-related cognitions need to be addressed in assessment and treatment. Especially female adolescents tend to develop dysfunctional maltreatment-related cognitions, and this is important to keep in mind when supporting them to cope with their maltreatment experiences.

List of abbreviations

CPTCI = Child Posttraumatic Cognitions Inventory

CPTCI-PC = Subscale CPTCI permanent and disturbing change

CPTCI-SW = Subscale CPTCI fragile person in a scary world.

DSM = Diagnostic and Statistical Manual of Mental Disorders

JVQ = Juvenile Victimization Questionnaire

PTSD = Posttraumatic Stress Disorder

PTSS = Posttraumatic Stress Symptoms

SDQ = Strengths and Difficulties Questionnaire

SPSS = Statistical Package for Social Sciences

UCLA PTSD-RI = University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index

Declarations

Ethics approval and consent to participate

This study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All caregivers or legal guardians gave their informed consent, and children and adolescents provided their informed assent prior to their inclusion in the study

Trial registration: DRKS00003979. Registered 03 July 2012.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

All authors have read and approved the final manuscript. AdH carried out the analyses and drafted the initial manuscript. HGG, AM, and AW coordinated the data collection and critically reviewed the manuscript. LG conceptualized and designed the study, supervised data collection and analyses, and critically reviewed the manuscript.

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Study 2

3.2 Do Dysfunctional Posttraumatic Cognitions Play a Mediating Role in Trauma Adjustment? Findings from Interpersonal and Accidental Trauma Samples of Children and Adolescents.

de Haan, A., Tutus, D., Goldbeck., L., Rosner, R., & Landolt., M. A. (under review). Do dysfunctional posttraumatic cognitions play a mediating role in trauma adjustment? Findings from interpersonal and accidental trauma samples of children and adolescents.

Study 3

3.3 Dysfunctional Posttraumatic Cognitions and Symptoms of Posttraumatic Stress Disorder and Depression in Children and Adolescents after Trauma: A Network Analysis

de Haan, A., Landolt, M. A., Fried, E., Kleinke, K., Alisic, E., Bryant, R., … & Meiser-Stedman, R. (in preparation). Dysfunctional cognitions, posttraumatic stress, and depression in children and adolescents exposed to trauma: a network analysis.

Study 4

3.4 Longitudinal Associations between Dysfunctional Maltreatment-Related Cognitions and Psychopathology in Children and Adolescents

de Haan, A., Keller, F., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (in second revision). Longitudinal associations between dysfunctional maltreatment-related cognitions and psychopathology in children and adolescents.

C General Discussion

This thesis focused on dysfunctional PTCs in children and adolescents exposed to trauma and maltreatment. The research on dysfunctional PTCs in children and adolescents is still in the early stages, although seen as relevant to developing and maintaining trauma-related distress and addressed in different trauma therapies. This section briefly summarizes and discusses the results, which address the two research aims: to investigate (1) trauma, individual, and social characteristics as predictors of dysfunctional PTCs, and (2) the association of dysfunctional PTCs and psychological symptoms. Secondly, the strengths and limitation of the studies are reflected on. Thirdly, implications for research and clinical practice are presented. The thesis closes with general conclusions.

1 Reflection on Empirical Findings

Table 23 relates the main results to the two research aims. They are discussed separately in the subsequent chapters (1.1. and 1.2).

1.1 Predictors of Dysfunctional Posttraumatic Cognitions

Possible predictors of dysfunctional PTCs were investigated in samples of children and adolescents exposed to TEs or maltreatment. In line with the Transactional Model of Coping with Trauma (Landolt, 2012), trauma, child, and social characteristics were examined. Mixed results emerged. Child characteristics such as younger age, for example, positively predicted dysfunctional PTCs in the accidental trauma sample, whereas in the interpersonal trauma sample, age had no effect on dysfunctional PTCs (Study 2). Other studies on dysfunctional PTCs have also produced mixed results regarding age (Diehle et al., 2015; Lee et al., 2018; Meiser-Stedman, Smith, et al., 2009). The findings of this thesis suggest that age or developmental status of the child cannot per se be seen as a risk or protective factor but that the impact of age might be confounded by other trauma, child, and social characteristics. This interpretation is supported by Study 1's finding of an interaction effect of age and sex: female adolescents reported the highest level of dysfunctional PTCs. Furthermore, Lee et al. (2018), who were the only researchers to report a significant age effect, with older adolescents reported higher levels of dysfunctional PTCs, used a sample of mainly female participants (93.7 %). Consequently, their age findings cannot be seen independently from sex and might be further confounded by the severity of the TE. The adolescents in their study, for example, had a higher rate of exposure to rape than non-penetrative sexual harassment compared to children.

Table 23

Summary of studies included in the thesis

Study 1	***Dysfunctional maltreatment-related cognitions in children and adolescents***
Sample	231 children aged 8–17 years who had experienced maltreatment
Aims	- To explore possible predictors for dysfunctional PTCs - To investigate associations of dysfunctional PTCs with PTSS, internalizing and externalizing problems
Main statistical analysis	- Multiple linear regression analysis - Spearman's correlations
Main results	- Significant predictors of dysfunctional PTCs: Sex; interaction of sex and age; five different maltreatment types compared to single-type maltreatment - Dysfunctional PTCs correlated highly positive with PTSS and internalizing problems, moderately positive with externalizing problems
Study 2	***Do dysfunctional posttraumatic cognitions play a mediating role in trauma adjustment? Findings from interpersonal and accidental trauma samples of children and adolescents***
Sample	- A Swiss sample of 114 participants aged 7-16 exposed to an accidental TE - A German sample of 113 participants aged 6-17 exposed to an interpersonal TE
Aims	To investigate whether characteristics of the child and the social environment impact child PTSS and depression, either directly or indirectly via the child`s dysfunctional PTCs
Main statistical analyses	Mediation analyses via structural equation modelling
Main results	- Accidental trauma sample: dysfunctional PTCs mediated the positive associations of younger age and lower parental educational level on child`s PTSS, but not on depression - Interpersonal trauma sample: female sex positively predicted child depression; parental dysfunctional PTCs positively predicted both child PTSS and depression; no mediation effect of child dysfunctional PTCs on PTSS or depression - Child dysfunctional PTCs positively, moderately to strongly, predicted child PTSS and depression in both trauma samples

Study 3	***Dysfunctional cognitions, posttraumatic stress, and depression in children and adolescents exposed to trauma: a network analysis***
Sample	17 data sets from 8 different countries with 2313 children and adolescents aged 6 to 18 years exposed to various TEs
Aims	- To investigate central items, bridging items, and the associations within and between constructs in a network of dysfunctional PTCs, ICD-11 PTSD symptoms, and depression in children and adolescents
Main statistical analysis	Network analysis
Main results	- The PTSD re-experiencing symptoms *strong or overwhelming emotions* and *strong physical sensations* and the depression symptom *difficulty concentrating* emerged as most central - Items from the same construct were more strongly connected with each other than with items from the other constructs - Both dysfunctional PTCs and PTSD were more strongly connected to symptoms of depression than to each other
Study 4	***Longitudinal associations between dysfunctional maltreatment-related cognitions and psychopathology in children and adolescents***
Sample	263 children and adolescents aged 8 to 17 who had experienced maltreatment
Aims	To investigate longitudinally the relationship between dysfunctional PTCs, PTSS as well as internalizing and externalizing problems in a sample of children and adolescents with a history of maltreatment
Main statistical analyses	Cross lagged panel analyses with three time points
Main results	- Dysfunctional PTCs, PTSS, internalizing and externalizing problems significantly decreased over time - Moderate to strong autoregressive paths emerged for all variables (meaning relative stability = the rank-associations between participants stayed the same) - Cognitions, PTSS, internalizing and externalizing problems were moderately to highly correlated at every measurement point - PTSS predicted dysfunctional PTCs, internalizing and externalizing problems 6 months later - Age, sex, and maltreatment characteristics did not play a role in these cross-lagged relations when they were included as covariates

In line with Diehle et al. (2015) and Meiser-Stedman, Smith, et al. (2009), female sex was associated with more dysfunctional PTCs in the interpersonal TE (Study 2) and the maltreatment sample (Study 1 and 4). However, no sex differences were found in the accidental TE sample (Study 2), which is thus in line with Lobo et al.'s (2015) results. Again, it is possible that female sex is not a risk factor per se for dysfunctional PTCs in the aftermath of TEs but has an effect as risk factor in combination with other characteristics such as type of TE, type of maltreatment, and personality characteristics.

The impact of characteristics of the TE or maltreatment were also investigated. In the maltreatment sample, children and adolescents with different types of index events did not differ significantly in their level of dysfunctional PTCs (Study 1). Furthermore, children who had experienced sexual abuse were compared with children who had not suffered this kind of TE. Sexual abuse had a weak effect on dysfunctional PTCs (Study 4). Although the index event did not explain differences in trauma adjustment, investigating trauma samples separately (see Study 3) showed varying associations between risk factors, dysfunctional PTCs, and psychological symptoms. Since variables cannot be seen independently but interact with each other (cf. Transactional Model of Coping with Trauma; Landolt, 2012), trauma history was included. Multi-type maltreatment (i.e. experiencing more than one maltreatment type such as physical and sexual abuse) did not have a significant effect on dysfunctional PTCs compared to single-type maltreatment (Studies 1 and 4). Notably, these samples mostly comprised participants who reported multi-type maltreatment. The distinct differences in subsample sizes could be one reason for the nonsignificant findings. Furthermore, the number of maltreatment types was used. Experiencing all five types of maltreatment (sexual abuse, physical abuse, emotional abuse, domestic violence, and neglect) led to significantly more dysfunctional PTCs than did single-type maltreatment (Study 1). However, this also means that experiencing two to four maltreatment types rather than single-type maltreatment did not predict significantly more dysfunctional PTCs. The same finding emerged in the accidental and interpersonal trauma sample, where the number of trauma types experienced had no effect on dysfunctional PTCs (Study 2). Again, these samples mostly comprised participants who reported either single or multiple types of TEs, which might be one reason for the nonsignificant findings. Nonetheless, one may conclude that the dose–response relationship (Neuner et al., 2004) might not hold for dysfunctional PTCs.

Furthermore, social characteristics were investigated. In Study 1, neither out-of-home care nor migration background emerged as significant predictors of dysfunctional PTCs in

children and adolescents exposed to maltreatment. Study 2 included parental dysfunctional PTCs related to their child's TE, parental PTSS, marital status, and parental level of education. Only the parental education level predicted child dysfunctional PTCs in the accidental trauma sample. This is in line with findings on child PTSD: Landolt et al. (2013) reported that children from families with lower parental education had an increased risk of PTSD and concluded that children coming from families with lower educational level or socio-economic status (SES) might have fewer resources for dealing with TEs.

Parental dysfunctional PTCs regarding their child's TE were directly associated with child PTSS and depression in the interpersonal TE sample. An explanation might be that dysfunctional PTCs in parents lead to a more overprotective parenting style, less child autonomy, and more communication about current threat possibilities (Cobham & McDermott, 2014), which subsequently hinder the child's trauma adjustment. It seems relevant that parental dysfunctional PTCs need to be considered when assessing and treating families in the aftermath of child TEs (cf. Hiller et al., 2016).

1.2 Relations with Psychological Symptoms

In line with the literature (e.g. Mitchell et al., 2017), all four studies showed strongly positive associations between dysfunctional PTCs and PTSS and depressive symptoms. Cognitive theories (e.g. the Cognitive Model of Posttraumatic Stress Disorder; Ehlers & Clark, 2000) suggest that dysfunctional PTCs play an important role in the maintenance of PTSS/PTSD. However, our findings suggested a different angle. Longitudinally, PTSS predicted dysfunctional PTCs and not vice versa. Furthermore, PTSD re-experiencing symptoms *strong or overwhelming emotions* and *strong physical sensations* together with the depression symptom *difficulty concentrating* (note that this is a PTSD symptom in DSM-5) emerged as the most central symptoms in a network model of dysfunctional PTCs, PTSD, and depression symptoms (most central means that they had the most connections to other items in the network). In contrast, items of dysfunctional PTCs did not play a central role. Taking both findings together, one may conclude that PTSS might drive dysfunctional PTCs rather than dysfunctional PCTs drive PTSS (in line with the Cognitive Vulnerability Model, Hankin & Abramson, 2002). However, more research is needed to draw clinical implications, especially because these findings are in contrast to Palosaari et al.'s (2016) findings on cross-lagged associations between dysfunctional PTCs and PTSS in children and adolescents. Furthermore,

another recent network analysis in children and adolescents exposed to TEs investigated DSM-5 PTSD symptoms and reported that symptoms of the PTSD cluster negative alterations in cognitions and mood emerged as central (Bartels et al., in press).

Interestingly, dysfunctional PTCs and PTSS were more strongly connected to depression symptoms than to each other. Furthermore, PTSS and depression symptoms were significantly more strongly connected to each other than they were associated with PTCs. Longitudinal studies in children and adolescents reported that depression symptoms predicted PTSS two months (Palosaari et al., 2016) and six months later (Ying et al., 2012), but not vice versa. However, neither depression symptoms predicted dysfunctional PTCs, nor did dysfunctional PTCs predict depression symptoms (Palosaari et al., 2016). Taking these findings together suggests that, in line with trauma models developed for PTSD and depression, dysfunctional PTCs are indeed a distinctive trauma mechanism rather than just another (PTSD) symptom. The inclusion of dysfunctional PTCs as symptoms of the PTSD diagnosis operationalized in DSM-5 (APA, 2013) might therefore artificially create a construct overlap. However, more research is needed into both the construct validity of dysfunctional PTCs and PTSD and their directionality of association.

Dysfunctional PTCs were moderately positively associated with self-reported externalizing problems in the maltreatment sample (Study 1 and 4). Significant associations have been reported before (Hiller, Creswell, et al., 2018; Leeson & Nixon, 2011; Liu & Chen, 2015). However, only weak associations emerged in these studies. The difference might be explained by the fact that those studies used proxy reports to assess externalizing symptoms, whereas in this thesis, externalizing problems were assessed via self-reports. Discrepancies between self-reports and proxy reports are in line with the literature (Achenbach et al., 1987; Bajeux et al., 2018).

2 Reflection on Study Methods

The specific strength and limitations are comprehensively described in each paper. Only overarching and major strengths and limitations are described here.

2.1 Strengths of the Present Thesis

The main strength of this thesis is the use of a range of international trauma and maltreatment samples to raise the generalizability of the thesis's findings. Other studies on dysfunctional PTCs in children and adolescents have combined international trauma samples before, but only from English speaking countries such as the United Kingdom and Australia (McKinnon et al., 2016; Meiser-Stedman, Smith, et al., 2009). The studies presented here extend this research in two crucial ways: 1) Creating the CPTCI International Data Set combined different languages and cultural backgrounds from both the Eastern and Western worlds. 2) The German speaking area has had few studies on dysfunctional PTCs in children and adolescents. Therefore, the studies included in this thesis add important findings on the dysfunctional PTCs in German-speaking children and adolescents.

In addition to the range of languages and cultural backgrounds, this thesis combined a variety of TE and maltreatment types. Most prior studies focused on one or two types per study, emphasizing single TEs and mostly using accidental TE samples. The work presented in this thesis extends the current state of research by including both accidental and interpersonal TEs. For example, Study 3 included all kinds of TEs, such as accidental TEs, interpersonal TEs, disasters, and war experiences. Furthermore, Studies 1 and 4 focused on maltreatment samples, which were previously clearly underrepresented.

A broad age spectrum ranging from 6-to-18-year old children and adolescents helped to investigate age differences in dysfunctional PTCs.

Adequate sample sizes were used in all studies. Consequently, state-of-the-art analyses could be applied to approach the topic of dysfunctional PTCs in children and adolescents from new angles. Studies 1 and 2 are among the first studies to analyse predictors of dysfunctional PTCs in a multivariate way. Study 3 is one of the first studies to conduct a network analysis in children and adolescents exposed to trauma. Study 4 is one of the first studies to conduct a cross-lagged panel analysis of dysfunctional PTCs in children and adolescents.

2.2 Limitations of the Present Thesis

Although the greatest strength of this thesis is the use of international trauma and maltreatment samples, most samples were European (Germany, Switzerland, and United Kingdom). Even in the CPTCI International Data Set, which combine various languages and cultural backgrounds from both the Eastern and Western worlds, countries from Africa and the

Eastern world are not included or underrepresented. Therefore, a generalizability of the findings might only be possible for the Western world.

Furthermore, combining heterogeneous samples came with some disadvantages. For example, using different measures or editions led to many missing values in PTSD and depression symptoms in the CPTCI International Data Set (Study 3). The network approach has not yet developed a method for dealing with missing data. Therefore, correlations among cognitions and symptoms were estimated based on pairwise complete observations (cf. Fried et al., 2018; Santos et al., 2017). Data that were missing because they were never intended to be collected in the first place, such as the use of multiple questionnaires containing different subsets of items, is assumed to be missing completely at random or at least missing at random (Schafer & Graham, 2002). However, it might still have distorted our results. Maximum-likelihood based missing data methods were applied (full information maximum likelihood—FIML; expectation maximation—EM) in the other three studies to render results more comparable.

Although this thesis used various state-of-the-art approaches, it is important to keep in mind that statistical methods are a constant work in progress. For example, between-subject results vs. within-subject levels need to be considered more thoroughly (see Fisher et al., 2018; Hamaker et al., 2015).

Possible confounding variables were taken into account: age at assessment, sex, trauma or maltreatment history. However, the impact of time since TE and age at TE could not be controlled for, since this information was not collected in the studies. Furthermore, parental variables and other social characteristics such as social support were rarely included in the analyses, although other studies have reported significant associations with dysfunctional PTCs (Hitchcock et al., 2015; Münzer et al., 2017; Palosaari et al., 2016).

Three out of the four studies had a cross-sectional design (Studies 1, 2, and 3). Therefore, causal conclusions cannot be drawn in these cases. However, to create a sense of anteriority/chronology with regards to dysfunctional PTCs the predictive value of demographic or trauma-related data was the main topic investigated.

Finally, the studies focused on self-reports from the children, since the main focus was on dysfunctional PTCs, a subjective construct. As discussed before, results might differ from others due to discrepancies between self-reports and proxy reports. To include both could have given a broader picture. Furthermore, in most studies of this thesis the self-report was gathered

using paper-and-pencil questionnaires. Therefore, problems in understanding might have occurred without being noticed.

3 Considerations for Future Research and Clinical Practice

The thesis provides important implications for future research and clinical practice. Again, specific recommendations can also be found in the studies themselves.

3.1 Implications for Future Research

Although the thesis adds new insights into dysfunctional PTCs in children and adolescents, many topics still need further clarification:

1) In line with the current state of research, all studies in this thesis showed that dysfunctional PTCs were associated with psychological symptomatology. However, studies including externalizing problems are still rare. Research focusing on directed relations between externalizing problems and dysfunctional PTCs would be especially important.

2) Dysfunctional PTCs and PTSD symptoms were more strongly connected to depression than to each other in the network model. Depression might play a role in dysfunctional PTCs and PTSD symptoms, either as a cause or as an outcome. Investigating the role of depression longitudinally might be a promising way to gain further insight into the relationship of dysfunctional PTCs with PTSD.

3) Future research might benefit from addressing dysfunctional PTCs more specifically, by analysing individual PTCs or patterns in different subsamples. Specific patterns of dysfunctional PTCs might be more relevant in specific subsamples, such as female trauma survivors or those exposed to interpersonal trauma. Using network analyses to elaborate more on dysfunctional PTCs in different subsamples might be promising.

4) The cognitions assessed with the CPTCI display only a limited range of cognitions. It does not include, for instance, self-blame and guilt. These have been found as both risk and protective factors of acute and chronic stress (Haag et al., 2015; Punamäki et al., 2015; Startup, Makgekgenene, & Webster, 2007). Extending research on dysfunctional PTCs beyond the CPTCI would shed a broader light on the association between dysfunctional PTCs and posttraumatic symptomatology.

5) Functional and adaptive PTCs merit more attention. So far, only Hitchcock et al. (2015) investigated their associations with dysfunctional PTCs in children and adolescents. Research focusing on adaptive mechanisms rather than the presence or absence of disorders is rare in clinical fields, especially in children and adolescents (Alisic et al., 2011). Tedeschi and Calhoun (2004) indicate that cognitions play a major role in whether a traumatic experience might even entail positive consequences, such as posttraumatic growth.

6) Since research on depression found significantly different cognitive style trajectories emerging in males and females between the age of 11 and 15 (Mezulis et al., 2010), cohort studies assessing children over a long period of time could help to better understand sex differences in dysfunctional PTCs and higher prevalences of PTSD and depression in female adolescents (Alisic et al., 2014; Salk et al., 2017).

7) Although many and various predictors for dysfunctional PTCs have been included in the studies of this thesis, there are still other variables that have not yet been addressed and need to be investigated in future research: parenting behaviours, personality traits of the child, and the role of relations to peers and siblings.

3.2 Implications for Clinical Practice

The predictive value of specific trauma, child, and social characteristics yielded mixed and often weak results; this suggests that dysfunctional PTCs can occur in practically every constellation of trauma, child, and social characteristics. Therefore, dysfunctional PTCs should be routinely included in clinical assessment, especially since strong to moderate associations with PTSS, depression symptoms, internalizing and externalizing problems were reported consistently across studies.

Clinical implications could be drawn for treatment as well. Findings from the longitudinal study suggested that PTSS might impact dysfunctional PTCs and not vice versa. Psychoeducation in regard to one's own PTSS needs to be incorporated explicitly in treatment. A greater focus on the subjective view of the amount of distress originating from PTSS re-experiencing, avoidance, and hyperarousal symptoms may also prove beneficial focusing on how the child or adolescent rates the symptoms' existence, severity, and impact on his or her life for today and the future rather than relying on a proxy report from parents and therapists. As mentioned in Ehlers and Clark's (2000) Cognitive Model of Posttraumatic Stress Disorder,

one's own PTSS might be interpreted as indications that one has permanently changed for the worse or even as indicators of a threat to one's physical or mental well-being.

Furthermore, the network analysis showed that dysfunctional PTCs and PTSS were more strongly connected to depression than to each other. Schindel-Allon et al. (2010) suggested that depression symptoms might hinder engagement in exposure to trauma-related reminders. However, such exposure is crucial for recovery. Therefore, depressive symptoms might need to be considered or addressed first if they impede successful trauma treatment. However, guidelines consistently recommend trauma-focused treatment as the first-line treatment for PTSD in children, adolescents, and adults (Forbes et al., 2010). Approaches combining depression and PTSD therapy might be considered, such as manualized therapy incorporating behavioural activation for depression in early sessions and exposure therapy and cognitive restructuring for PTSD in later sessions (Nixon & Nearmy, 2011). Note that findings from this thesis cannot be used to verify any treatment mechanisms. Treatment studies in children and adolescents have shown that dysfunctional PTCs may be a promising mechanism to decrease PTSS in cognitive therapy (Meiser-Stedman, Smith, et al., 2017; Pfeiffer, Sachser, de Haan, et al., 2017). However, reciprocal relationships may also need to be considered. For example, one study in female adults showed that prolonged exposure (PE) primarily affected PTSS, which in turn affected depressive symptoms. In contrast, PE with cognitive restructuring resulted in a more reciprocal relationship between PTSS and depressive symptoms (Aderka, Gillihan, McLean, & Foa, 2013).

Furthermore, the significant association of dysfunctional PTCs and externalizing behaviour needs to be considered in clinical practice. Otherwise, maltreated children with externalizing symptoms may be treated only at the behavioural level, and the underlying cognitive component may be neglected. The relationship between dysfunctional PTCs and externalizing problems might explain why trauma exposure produces biases such as hostile attributional bias and, in combination with deficits in social information processing, places individuals at risk of responding aggressively (Taft et al., 2017). Dysfunctional PTCs might lead to a feeling of current threat. As a consequence, children and adolescents might react aggressively to protect themselves. Therefore, targeting dysfunctional PTCs could be a crucial component in the treatment of aggressive children with trauma history, in addition to social skill training and emotion regulation training.

4 General Conclusions

This thesis showed that dysfunctional PTCs seem universally relevant in children and adolescents exposed to TEs or maltreatment. Addressing them in clinical assessments and therapy therefore seems important. The use of international samples, state-of-the-art analyses, and new or barely investigated research questions might encourage other researchers to tackle further relevant topics from new angles, such as the important question for both research and clinical practice of the directed relationship between dysfunctional PTCs, PTSS such as re-experiencing, avoidance, and hyperarousal, and depression symptoms.

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Statement of Authorship

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Erklärung

Hiermit erkläre ich, dass die Dissertation von mir selbst ohne unerlaubte Beihilfe verfasst worden ist und diese Dissertation noch an keiner anderen Fakultät eingereicht wurde.

Ort und Datum Unterschrift

Zürich, 22.11.2018 Anke de Haan

Curriculum Vitae

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Education

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Professional Societies

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Publications

- Pfeiffer, E., de Haan, A. & Sachser, C. (in press). Klassifikation und Diagnostik der PTBS im Kindes- und Jugendalter. *Trauma & Gewalt.*
- Christie, H., Talmon, A., Schäfer, S. K., de Haan, A., Vang, M. L., Haag, K., Gilbar, O., Alisic, E. & Brown, E. (2017). The transition to parenthood following a history of childhood maltreatment: A review of the literature on prospective and new parents' experiences. *European Journal of Psychotraumatology*, 8, 1492834.
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- de Haan, A., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (2017). Dysfunctional maltreatment-related cognitions in children and adolescents. *Child and Adolescent Psychiatry and Mental Health, 11,* 31.
- de Haan, A. & Haag, A.-C. (2016). Traumatisierung bei Kindern nach Unfällen. In Deutsche Kinderhilfe e.V. (ed.), *Themenmagazin Unfallprävention im Kindesalter – Für ein rundum sicheres Aufwachsen unserer Kinder* (pp. 37-39). Berlin: Deutsche Kinderhilfe e.V.
- de Haan, A., Petermann, F., Meiser-Stedman, R. & Goldbeck, L. (2016). Psychometric properties of the German version of the Child Post-Traumatic Cognitions Inventory (CPTCI-GER). *Child Psychiatry & Human Development, 47,* 151–158. doi: 10.1007/s10578-015-0552-0

Book Chapter

- de Haan, A., Deegener, G. & Landolt, M. A. (in press). Gewalt in der Kindheit und ihre Folgen. In Maercker, A. (Ed.). *Traumafolgestörungen, 5. Aufl.* Heidelberg: Springer.

Work in Progress

- de Haan, A., Landolt, M. A., Fried, E., Kleinke, K., Alisic, E., Bryant, R., … & Meiser-Stedman, R. (in preparation). Dysfunctional cognitions, posttraumatic stress, and depression in children and adolescents exposed to trauma: a network analysis.
- de Haan, A., Tutus, D., Goldbeck., L., Rosner, R., & Landolt., M. A. (under review). Do dysfunctional posttraumatic cognitions play a mediating role in trauma adjustment? Findings from interpersonal and accidental trauma samples of children and adolescents.
- de Haan, A., Keller, F., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (in second revision). Longitudinal associations between dysfunctional maltreatment-related cognitions and psychopathology in children and adolescents.

Invited Speaker

- de Haan, A. (2015, October). Die Relevanz dysfunktionaler posttraumatischer Kognitionen für die Betreuung von Kindern und Jugendlichen. 4th Fachtagung Notfallpsychologie, Magdeburg, Germany.

Chair

- de Haan, A. (2017, June). Symposium: Child and Parental Posttraumatic Cognitions in the Aftermath of Child Trauma: Recent Findings and New Directions. 15th Conference of the European Society for Traumatic Stress Studies (ESTSS), Odense, Denmark.

Talks

- de Haan, A., Rutishauser, N. & Landolt, M. A. (2018, November). Do parental dysfunctional posttraumatic cognitions about their child`s accidental trauma impact child and adolescent cognitions? 3rd conference of the Competence Center for Mental Health, Zurich, Switzerland.
- de Haan, A., Degen, E. & Landolt, M.A. (2018, October). Longitudinal associations between posttraumatic cognitions and posttraumatic stress and depression in children and adolescents after accidental trauma. 8th Conference of the Children's Research Center, University Children's Hospital Zurich, Switzerland.
- de Haan, A., Goldbeck, L., Ganser, H.G., Münzer, A., Witt, A. & Keller, F. (2018, May). Längsschnittlicher Zusammenhang von dysfunktionalen misshandlungsbezogenen Kognitionen, posttraumatischen Stresssymptomen und Verhaltensproblemen bei Kindern und Jugendlichen. 36th Symposium der Fachgruppe Klinische Psychologie und Psychotherapie der Deutschen Gesellschaft für Psychologie (DGPs), Landau, Germany.
- de Haan, A. & Landolt, M. A. (2018, March). Funktionale posttraumatische Kognitionen bei Kindern und ihren Eltern nach einem akzidentellen Trauma. 20th Annual Meeting of the German Speaking Society for Psychotraumatology (DeGPT), Dresden, Germany.
- de Haan, A. & Landolt, M. A. (2017, June). Functional Posttraumatic Cognitions in Children and Adolescents after Accidental Trauma. 15th Conference of the European Society for Traumatic Stress Studies (ESTSS), Odense, Denmark.
- de Haan, A., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (2017, February). Dysfunktionale misshandlungsbezogene Kognitionen bei Kindern und Jugendlichen. 19th Annual Meeting of the German Speaking Society for Psychotraumatology (DeGPT), Zurich, Switzerland.
- de Haan, A., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (2016, November). Dysfunctional Maltreatment-Related Cognitions in Children and Adolescents. 32nd Annual Meeting of the International Society for Traumatic Stress Studies (ISTSS), Dallas, US.
- de Haan, A., Petermann, F., Meiser-Stedman, R. & Goldbeck, L. (2015, February). Psychometrische Eigenschaften der deutschen Version des Child Post-Traumatic Cognitions Inventory (CPTCI-GER). 17th Annual Meeting of the German Speaking Society for Psychotraumatology (DeGPT), Innsbruck, Austria.

Posters

- de Haan, A., Goldbeck, L., Ganser, H. G., Münzer, A., Witt, A. & Keller; F. (2018, November). Longitudinal associations between dysfunctional maltreatment-related cognitions and psychopathology in children and adolescents. Poster presented at the 34rd Annual Meeting of the International Society for Traumatic Stress Studies (ISTSS), Washington, US.
- de Haan, A. & Landolt, M. A. (2017, November). Functional Posttraumatic Cognitions in Children and their Parents after Accidental Trauma. Poster presented at the 33rd Annual Meeting of the International Society for Traumatic Stress Studies (ISTSS), Chicago, US.
- de Haan, A. & Goldbeck, L. (2017, March). Die Relevanz dysfunktionaler posttraumatischer Kognitionen für die klinische Arbeit mit traumatisierten Kindern und Jugendlichen. Poster presented at the 35th Kongress der Deutschen Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie (DGKJP), Ulm, Germany.
- de Haan, A., Ganser, H. G., Münzer, A., Witt, A. & Goldbeck, L. (2016, May). Predictors of dysfunctional maltreatment-related cognitions in children and adolescents. Poster presented at the Conference MaDoKo, Department of Psychology, University of Zurich, Switzerland.

Awards

- **1st place**: de Haan, A., Rutishauser, N. & Landolt, M. A. (2018, November). Do parental dysfunctional posttraumatic cognitions about their child`s accidental trauma impact child and adolescent cognitions? Talk presented at the 3rd conference of the Competence Center for Mental Health, Zurich, Switzerland.
- **1st place**: Degen, E., Landolt, M. A. & de Haan, A. (2018, May). Zusammenspiel von traumabezogenen Kognitionen bei Kindern und Jugendlichen nach Verkehrs- und Verbrennungsunfällen. Poster presented at the Conference MaDoKo, Department of Psychology, University of Zurich, Switzerland.
- **1st place**: Rutishauser, N., Landolt, M. A. & de Haan, A. (2018, May). The impact of parental dysfunctional posttraumatic cognitions on child and adolescent cognitions following road traffic accidents and burn injuries. Poster presented at the Conference MaDoKo, Department of Psychology, University of Zurich, Switzerland.

Supervision of Master`s Theses

- Bratsos, M. (2017). Akute dysfunktionale traumabezogene Kognitionen bei Kindern und Jugendlichen nach Verkehrs und Verbrennungsunfällen. Child and Adolescent Health Psychology, Department of Psychology, University of Zurich, Switzerland.
- Degen, E. (2018). Zusammenspiel von traumabezogenen Kognitionen bei Kindern und Jugendlichen nach Verkehrs- und Verbrennungsunfällen. Child and Adolescent Health Psychology, Department of Psychology, University of Zurich, Switzerland.
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